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This Chapter was most recently called “Volume III: Grading, Erosion and Sediment Control” and was last updated by Board Resolution “#047-2007” in 2007 along with “Title 15.14 El Dorado County Grading, Sediment and Erosion Control Ordinance” (Grading Ordinance). This manual, and particularly this Chapter, supersedes “Volume III” in its entirety.

5.1 General Policies

- A. For any project that proposes grading, whether it is ministerial or discretionary, may require a grading permit, unless the project is exempted under the provisions of the “Grading Ordinance”. Grading permits may be required for residential building permits (all types), subdivisions, Parcel Maps, commercial projects, industrial projects, research & development projects, multi-family projects, etc. Even if a grading permit is not required, all other requirements as established by the County’s Design Manuals shall be followed. Projects proposed in the Tahoe Basin, ~~must~~ shall meet the Tahoe Regional Planning Agency’s (TRPA) requirements. See Section 5.3.3.5 of this Chapter.
- B. Except as otherwise noted in this Chapter, the provisions of the currently adopted “Soils and Foundations” and “Grading Appendix” chapters of the “California Building Code”, shall apply. (Reference: Appendix J, California Building Code, as may be amended from time to time.)
- C. This Chapter is not intended to supersede or otherwise preempt any applicable local, State, or Federal law or regulation. Where conflicts may occur between this Chapter and such laws or regulations, the most restrictive shall apply.
- D. Natural features, including vegetation, oak trees, watercourses, wetlands, steep slopes and similar resources shall be preserved consistent with the Policies, Objectives, and Implementation Measures of the *General Plan* (e.g., ~~Objectives “2.3.2”, “7.1.1”; Policies “2.3.2.1”, “7.1.2.1”, “7.1.2.2”, “7.1.2.3”; Measure “TC-U”~~), any applicable Specific Plan, the requirements of “Title 17 Zoning Ordinance”, the conditions of approval of any applicable discretionary permit, the “Oak Tree and Wetlands Preservation” standards included in this manual, and the requirements of the grading permit under which the work is conducted. ~~Notwithstanding any other requirement, these natural features shall be preserved to the extent feasible.~~
- E. Grading permits shall not be approved for a discretionary project until the discretionary project is approved by the appropriate decision making body of the County. Grading permits for ministerial applications which are zoned commercial, multi-family, industrial, or research & development, and all public facilities (e.g., parks, utilities, roads), shall not be issued without a Building Permit application which has been submitted to DSD Building Services for plan review. In unusual circumstances, the Director of the department responsible for issuing the grading permit may make an exception to these requirements.

- F. Agricultural grading is exempt from these provisions but may require an agricultural grading permit. The County's Department of Agriculture should be contacted for specific requirements relating to agriculture grading. ~~(530) 621-5520.~~
- G. No person shall perform any grading work or place obstructions within the right-of-way of a public road or street, or within a public easement under the jurisdiction of the County, without prior approval of the County Engineer.
- H. Public-County maintained roads shall comply with the County Highway Design Manual, Standards Plans, and Standard Specifications.

NOTE: It is the applicant's responsibility to apply for the appropriate permit from the appropriate department. An exemption granted by one department, for example the County's Department of Agriculture, does not entitle an applicant to an automatic exemption from obtaining a grading permit issued by another department, if the project falls under the purview of the latter. For more information, contact DSD.

5.2 DESIGN AND CONSTRUCTION STANDARDS

This manual contains multiple references to various agencies and source documents including contact information. These references can be found in a handout located at the DSD counter or website.

5.2.1 Earthwork

All earthwork shall comply with the applicable chapters and appendix sections of Appendix J of the California Building Code for design and construction standards. The following provisions reflect additional local requirements or clarifications:

5.2.1.1 Excavation – Cut Slope Standards

~~Cut slopes shall be constructed in a manner that does not create unstable conditions or induce severe erosion. The following minimum design standards are required to assure the stability of permitted cuts:~~

- ~~A. **Slope steepness:** No excavation shall be made with a cut face steeper in slope than two horizontal to one vertical (2:1). The face of cut slopes between terraces shall be no steeper than two horizontal to one vertical. A cut with a steeper slope may be permitted if the engineering, geotechnical engineering and engineering geology reports demonstrate that the underlying earth material is capable of standing on a steeper slope. A cut slope may be limited to steepness flatter than a two to one gradient due to the presence of earth materials that would potentially be unstable at such a slope angle~~
- ~~B. **Unsupported foliation or bedding planes:** No slope shall be cut at an angle steeper than the bedding/foliation planes or orientation of the principal joint sets in any formation where such planes or joints dip down toward the proposed cut face. A cut slope with this underlying condition (i.e. downslope-dipping bedding planes or joint sets) may be permitted if the engineering, geotechnical engineering and engineering geology reports demonstrate that the slope would be stable at a steeper angle.~~
- ~~C. **Adjacent structure protection:** Footings which may be affected by an excavation shall be protected against lateral movement and settlement. Fills or other surcharge loads shall not be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by such fill or surcharge.~~

Exception: ~~These~~ R requirements may be modified if recommended in an acceptable Geologic Report or Geotechnical Report.

5.2.1.2. Fill Construction Standards

~~Completed fills shall comply with Appendix J with the applicable provisions of the California Building Code. be stable masses of well-integrated material bonded to adjacent materials and to the materials on which they rest. Fills shall be competent~~

~~to support anticipated loads and be stable at the design slopes shown on the plans. U unless recommended otherwise in an acceptable Geotechnical Report, the following minimum design standards are required to assure the stability of permitted fills.~~

- ~~A. **Ground preparation for fill placement:** The natural ground surface shall be prepared to receive fill by the removal of all unsuitable material such as vegetation, top soil, landslide deposits or other unstable earth material and existing fill not installed in conformance with this manual. Where natural or pre-existing underlying slopes are five horizontal to one vertical (5:1) or steeper in gradient, keys and benches at least 10 feet wide shall be placed into competent earth material in an adequate manner.~~
- ~~B. **Placement of fill:** Fills shall be constructed in layers. The loose thickness of each layer of fill material before compaction shall not exceed eight inches.~~
- ~~C. **Fill compaction:** All fills shall be compacted throughout their full extent to a minimum relative compaction based on dry density as determined by ASTM test method D-1557 (or a successor standard adopted by the County), as follows:~~
- ~~1. Landscape fills: 85 percent;~~
 - ~~2. Fills intended to support structures: 90 percent;~~
 - ~~3. Fills intended to support vehicular ways: 90 percent with 95 percent in the top one foot;~~
 - ~~4. Temporary fill stockpiles: Compaction is not required unless it is determined that compaction is necessary to prevent instability or erosion of the fill.~~
- ~~D. **Fill Density (Compaction) Testing:** The number and distribution of tests required during construction to determine the density of compacted fills shall be determined by the following criteria:~~
- ~~1. A minimum of one test for each two feet of vertical lift is required;~~
 - ~~2. A minimum of one test for each 1,000 cubic yards of material placed is required;~~
 - ~~3. A minimum of one test for each 1,000 square feet in slope surface, including at least one test for each 10 vertical feet of slope height, is required. These tests shall be conducted on a point one foot below the fill surface;~~
 - ~~4. Test locations shall be uniformly distributed within the fill or along the fill slope surface to the extent feasible;~~
 - ~~5. Except for the tests required for the fill surface under item 3. above, testing may be waived for fills comprised of more than 35 percent rock by weight upon certification by the design professional¹ that the~~

¹ Design Professional: (In context of this Chapter) is a California registered Civil Engineer or Land Surveyor, or a California licensed Architect, Landscape Architect, Geologist, or Engineering Geologist; whose license is current and who practices under the authorization provided in the "Practice Act" of their particular profession as set forth in the "California Business and Professions Code".

~~fill will be inspected continuously during construction for adequacy of compaction and that testing is not feasible in the subject material.~~

~~Results of the density (compaction) testing and the distribution of test locations shall be presented in the periodic and final reports. Compaction may be less than 90 percent of maximum density, within six inches of the slope surface when such surface material is placed and compacted by an acceptable method for the planting of the slopes.~~

~~E. **Fill composition:** Earth materials shall be used which have no more than minor amounts of organic substances, and have no rock or similar irreducible material with a maximum dimension greater than 12 inches. The placement of larger rock may be permitted with a rock disposal plan prepared by a design professional that includes the following elements:~~

- ~~1. Delineation of potential rock disposal areas on the grading plan;~~
- ~~2. Placement of rocks greater than 12 inches in maximum dimension a minimum of two feet below grade;~~
- ~~3. The avoidance of "nested" rock disposal sites;~~
- ~~4. Placement of rocks in a manner such that all voids are filled with fines;~~
- ~~5. Continuous inspection of the rock placement by the responsible design professional;~~
- ~~6. Certification of the stability of the fill by the responsible design professional.~~

~~F. **Slope steepness:** No fill shall be constructed with a face steeper in slope than two horizontal to one vertical (2:1), exclusive of required terraces described herein. *(The face of fill slopes between terraces shall be no steeper than two horizontal to one vertical.)* A fill with a steeper slope may be permitted if the applicant demonstrates through engineering, geotechnical engineering and engineering geology reports, that the proposed fill material, including any proposed reinforcement, and the supporting native ground, would form a stable slope. Construction of a fill with a surface slope flatter than a two horizontal to one vertical may be required to assure stability and safety.~~

5.2.1.3 Terrace and Terrace Drainage Requirements

- ~~1. For cut or fill slopes up to 60 feet in height, terraces at least eight feet in width shall be established at not more than 30-foot vertical intervals on all cut slopes to control surface drainage and debris except that where only one terrace is required, it shall be at midheight.~~
- ~~2. For cut or fill slopes greater than 60 feet and up to 120 feet in vertical height, one additional terrace at approximately midheight shall be 12 feet in width.~~
- ~~3. Terraces shall slope a minimum of five percent gradient toward the hillside and be accessible for maintenance.~~

- ~~4. Terrace widths and spacing for cut or fill slopes greater than 120 feet in height shall be designed by a design professional and subject to review and acceptance by the Director of the department responsible for issuing the grading permit.~~
- ~~5. Suitable access shall be provided to permit proper cleaning and maintenance.~~
- ~~6. Terrace swales or ditches: Drainage facilities on terraces shall have a gradient of five to 12 percent and must be paved with reinforced concrete not less than three inches in thickness or an approved equivalent paving. The longitudinal terrace slope and the slope of the ditch or swale shall be equivalent. These facilities shall have a minimum depth at the deepest point of one foot and a minimum paved width of five feet. A single run of swale or ditch shall not collect runoff from a tributary area exceeding 13,500 square feet (projected) without discharging into a down drain. An alternate design prepared by a design professional may be approved.~~
- ~~7. Terrace rounding: Cut or fill slopes shall be rounded into the existing terrain to produce a contoured transition from cut face to natural ground.~~
- 8.A. Interceptor (Brow) Ditches: Interceptor ditches shall be provided above all cut or fill slopes exceeding 10 feet in height if the tributary drainage area above the cut slopes toward the cut and has a drainage path greater than 40 feet measured horizontally. Interceptor ditches shall be designed to accommodate the flow volume and velocity of runoff estimated for a 100-year storm event as determined in a County-accepted drainage report prepared by a Civil Engineer. They shall have a minimum depth of 12 inches and a minimum width of 30 inches measured horizontally across the drain. An alternate design prepared by a design professional may be approved.
- ~~9. Down drains: Down drains, drainage outlets and erosion protection for terrace and interceptor ditches shall be designed to accommodate the flow volume and velocity of runoff estimated for a 100-year storm event as determined in a County-accepted report prepared by a design professional~~
- B. Ditches shall be designed to accommodate 100 year storm events, but are not mandated to provide extra 1 foot "free board" as may otherwise be required in the Drainage Manual.

5.2.2 Storm Water Management Requirements, Erosion and Sediment Control, and Drainage

For projects on the West Slope of the Sierra Nevada in the County, storm water management, erosion and sediment control and drainage shall comply with the adopted County "Drainage Manual", ~~the~~ "Storm Water Management Plan" (SWMP) and ~~and all of the following:~~

- ~~A. If more than one acre of land will be disturbed, the applicant for a grading project in the County shall obtain coverage under the current Current California State Water Resources Control Board's (SWRCB) Order(s) regulating construction activities.~~

~~General Permit which, at the time of this writing, is "Construction Activities Storm Water General Permit Order No. 99-08-DWQ". The applicant shall provide proof of coverage under such SWRCB permit with the grading permit application.~~

- ~~B. The General Permit requires that any person performing such grading work:~~
- ~~1. Develop and implement a Storm Water Pollution Prevention Plan (SWPPP) which specifies Best Management Practices (BMPs) that will prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion from moving off-site into receiving waters;~~
 - ~~2. Eliminate or reduce non-storm water discharges to storm sewer systems and other waters of the County;~~
 - ~~3. Perform inspections of all BMPs.~~

~~B. Minimum construction site BMPs are listed in the County SWMP and the "Minimum Construction Site Storm Water Management Practices" available on the County website at:~~

- ~~B. <http://www.edcgov.us/emd/solidwaste/storm.html#SWMP> shall be implemented on all projects to control erosion and sediment, and other construction related pollutants.~~

~~Other approved requirements and BMPs are found in the County SWMP, "Section 4.4 Construction Site Runoff Controls" and the "Stormwater Best Management Practice (BMP) Construction Handbook" published by the California Stormwater Quality Association, and available on the web at:~~

~~<http://www.cabmphandbooks.com/>.~~

- ~~C. At construction sites, all reasonable measures shall be taken to prevent or avoid:~~
- ~~1. Discharge of sediment from the site, in quantities exceeding SWRCB standards, to any watercourse, drainage system, or adjacent property;~~
 - ~~2. Damage to watercourses and adjacent properties in the form of erosion, flooding, or deposition which may result from the permitted grading;~~
 - ~~3. Sediment deposition onto public or private vehicle ways.~~

~~D. Grading projects shall be designed to prevent increased discharge of sediment at all stages of grading and development, from initial disturbance of the ground to project completion, and shall be consistent with all local, State, and Federal rules and regulations.~~

~~E. Projects shall be designed with long-term erosion and sediment control as a primary consideration. Every feasible effort shall be made to ensure that site stabilization is permanent.~~

~~F. Temporary construction site BMPs to control erosion and sediment runoff shall be included in all projects. Implementation of temporary BMPs, however, may not be necessary based on the timing of completion of grading operations.~~

H.C. Erosion and sediment control measures shall include an effective revegetation program to stabilize all disturbed areas which will not be otherwise protected. See "Vegetation Establishment Guidelines for the Sierra Nevada Foothills and Mountains" published by the High Sierra Resource Conservation and Development Council (or the most current approved edition), available on the following website: <http://www.co.el-dorado.ca.us/emd/solidwaste/storm.html>.

~~All such areas where grading has been completed between May 1st and October 15th shall be planted and stabilized as soon as possible after the completion of grading but in no case later than by October 15th or at the recommendation of RCD. Graded areas disturbed at other times of the year shall be planted within 15 days after the completion of the work. If revegetation is infeasible or cannot be expected to stabilize an erodible area during any part of the rainy season, non-vegetative erosion and sediment control measures shall be required to prevent increased sediment discharge. During the rainy season, the smallest practical area of erodible land shall be exposed at any one time.~~

I.D. Topsoil salvage: No topsoil shall be removed from the site unless otherwise directed or authorized by the Director of the Department issuing the grading permit. Topsoil overburden shall be stockpiled and redistributed within the disturbed area to provide a suitable base for seeding and planting. Runoff from the stockpiled area shall be controlled to prevent erosion and resultant sedimentation of receiving water.

I.E. Drainage and :a

~~J.General requirements: Drainage structures and facilities shall be designed and constructed in accordance with the standards included in this manual, the County "Drainage Manual", the "California Building Code", Natural Resource Conservation Service guidelines, and other documents as appropriate.~~

~~K.Protection of adjoining property: When surface drainage is discharged onto any adjoining property, it shall be discharged in a manner that it will not cause erosion or endanger any cut or fill slope or any building or structure. Runoff water shall not be conveyed off-site in a concentrated manner unless directed to an existing watercourse or established drainage easement.~~

Aa acceptance of historic runoff: All grading projects shall be designed to convey the runoff water historically delivered to the site from off-site property to an adequate storm drain or existing watercourse.

~~1.Drainage control on building pads: Unless waived, building pads shall have a drainage gradient of two percent toward approved drainage facilities, or a one percent gradient if all of the following conditions exist throughout the permit area:~~

- ~~a. No proposed fills are greater than 10 feet in maximum depth;~~
- ~~b. No proposed finish cut or fill slope faces have a vertical height in excess of 10 feet;~~

- ~~c. No existing slope faces steeper than one unit vertical in 10 units horizontal (10 percent slope) have a vertical height in excess of 10 feet.~~

For projects in the Tahoe Basin, the provisions of this manual shall apply, except where those provisions are in conflict with the requirements of the Lahontan Regional Water Quality Control Board (RWQCB) or the Tahoe Regional Planning Agency (TRPA). In such cases, the requirements of the Lahontan RWQCB or TRPA shall take precedence. Further information may be found on the web at:

http://www.waterboards.ca.gov/lahontan/water_issues/programs/storm_water/index.shtml

5.2.3 Setbacks

5.2.3.1 General Requirement

Cut and fill slopes shall be set back from permit area boundaries (boundary) in accordance with ~~Appendix J of the California Building Code, this section. Setback dimensions shall be horizontal distances measured perpendicular to the boundary. These boundaries may be property lines or the edges of a specific permit area within a parcel delineated under the terms of an applicable permit. (Exceptions may be made for example, when an applicant obtains a slope easement from a neighboring property owner.)~~

5.2.3.2 Grading Setbacks

~~Setback dimensions shall be as shown in Figure 1.~~

~~**A. Top of Cut Slope:** The top of cut slopes shall not be made nearer a permit area boundary (boundary) than one fifth the vertical height of cut with a minimum of two feet and a maximum of 10 feet. The setback may need to be increased for required interceptor drains.~~

~~**B. Toe of Fill Slope:** The toe of the fill slope shall not be made nearer to the boundary than one half the height of the slope with a minimum of two feet and a maximum of 20 feet. Where a fill slope is to be located near the boundary and the adjacent off-site property is developed, special precautions shall be incorporated in the work as necessary to protect the adjoining property from damage as a result of such grading. These precautions may include but are not limited to:~~

- ~~1. Additional setbacks,~~
- ~~2. Provision for retaining or debris walls,~~
- ~~3. Mechanical or chemical treatment of the fill slope surface to minimize erosion, or~~
- ~~4. Provisions for the control of surface waters.~~

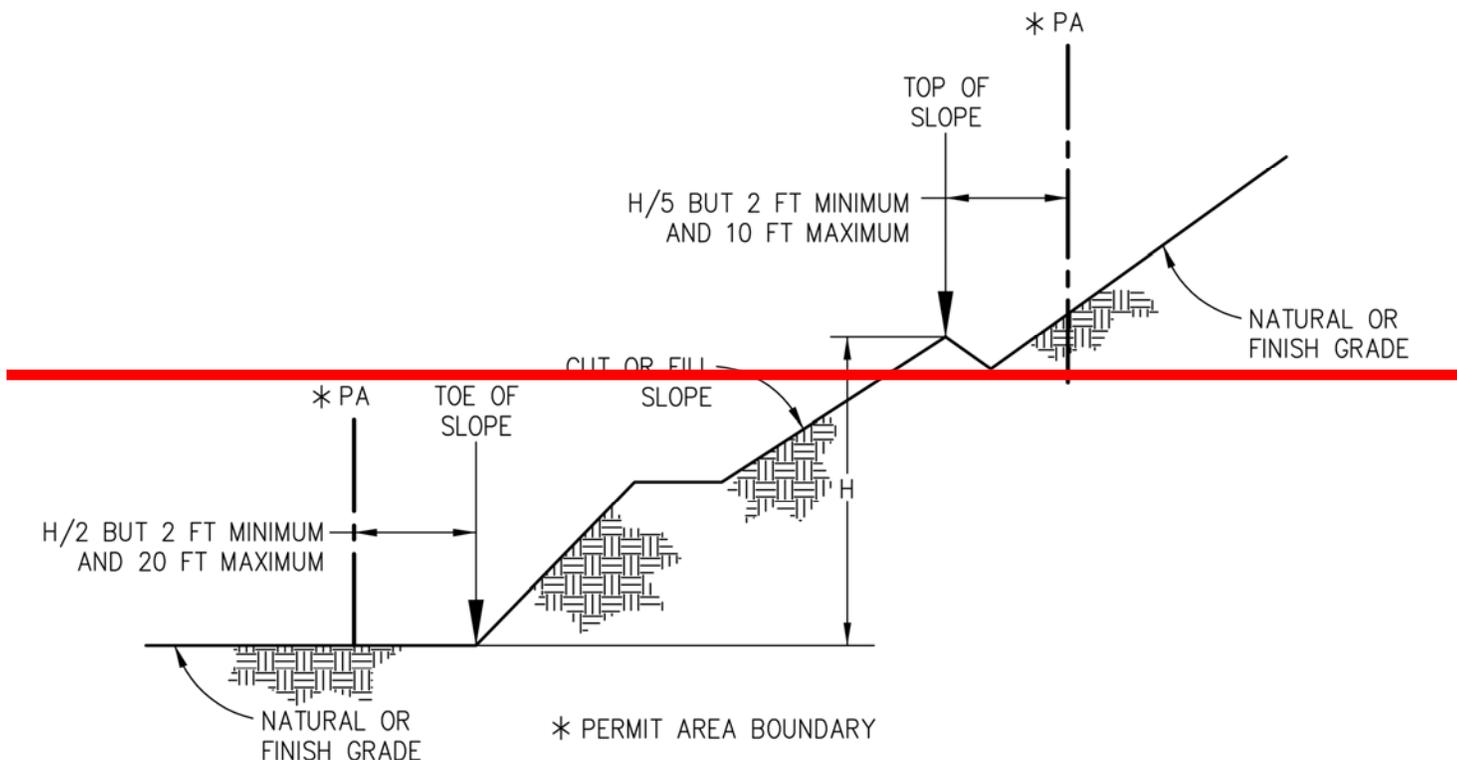


FIGURE 1: SETBACK DIMENSIONS FOR GRADED SLOPES

5.2.3.3 Building Setbacks from Slopes

Notwithstanding other requirements such as zoning and Fire Codes, buildings shall be set back from the edge of graded and natural slopes in accordance with this section. Setback dimensions shall be horizontal distances measured perpendicular to the edge of a graded slope. Setback dimensions shall be as shown in the Figures 2, 3a, and 3b.

A. Top of Descending Slope: Foundation footings on or adjacent to slope surfaces shall be founded in firm material with an embedment and setback from the slope surface sufficient to provide vertical and lateral support for the footing without detrimental settlement. The setback dimensions indicated in the figures which follow are deemed adequate, except where the adjacent slope exceeds 100 percent gradient (i.e. greater than 1 to 1). In the case of slopes that exceed 100 percent, the required setback indicated in the figures which follow shall be measured from an imaginary plane projecting upward at a 45-degree angle from the toe of the slope.

B. Toe of an Ascending Slope: The setback dimensions indicated in the figures which follow are deemed adequate, except where the adjacent slope exceeds 100 percent gradient (i.e. greater than 1 to 1). Where the adjacent slope exceeds 100 percent gradient, the required setback shall be based on the following parameters:

The toe of the slope shall be assumed to be at the intersection of a horizontal plane drawn from the top of the foundation and a plane drawn tangent to the slope at an angle of 45 to the horizontal;

Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope.

5.2.3.4 Modification of Slope Location

Alternate slope setbacks that are consistent with the property line setbacks

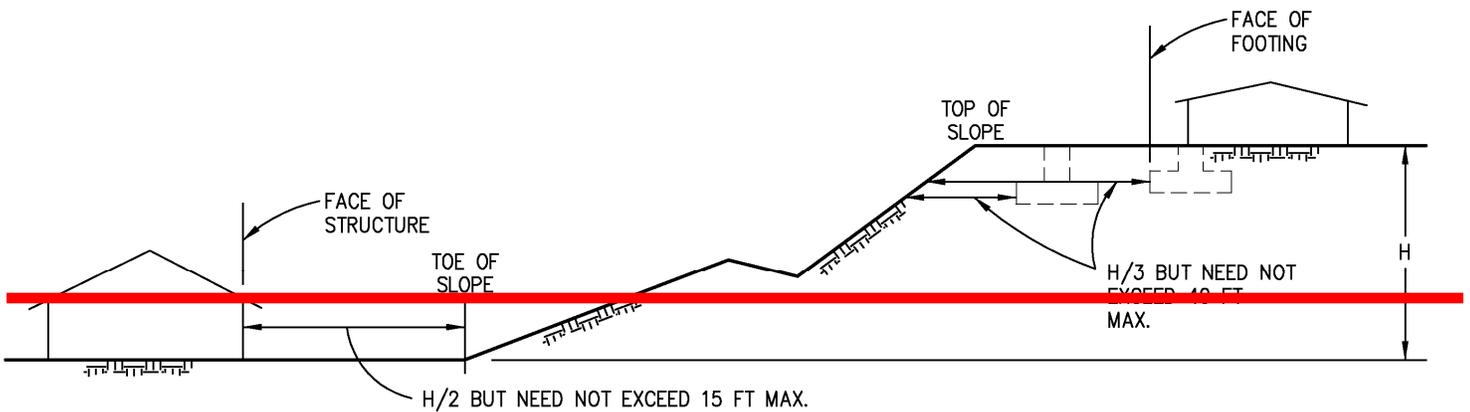


FIGURE 2: SETBACK DIMENSIONS FOR BUILDINGS FROM GRADED AND NATURAL SLOPES

specified in the "Title 17 Zoning Ordinance" may be approved. An investigation and recommendation by a qualified engineer or engineering geologist may be required to demonstrate that the intent of this section has been satisfied. Such an investigation shall address the height of slope, slope gradient, load intensity and erosion characteristics of the material. The following diagrams illustrate approved alternate building and accessory structure setbacks for slopes modified with the installation of a retaining wall(s). Such walls require design and analysis by a design professional and must incorporate surface and subsurface drainage facilities (not shown in Figures 3a and 3b which follow). Refer to retaining wall design standards discussed later in this Chapter.

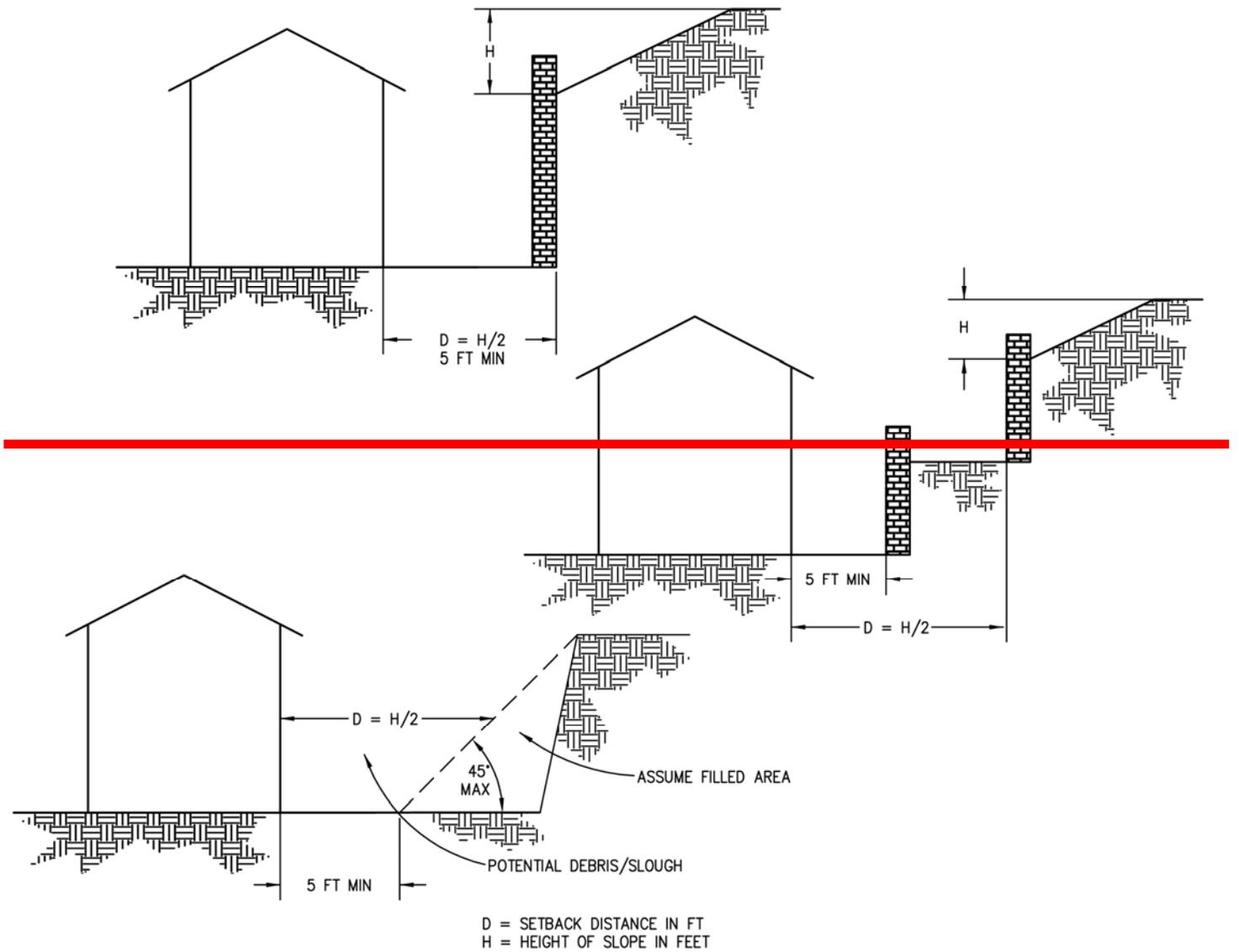


FIGURE 3a: ALTERNATE APPROVED SETBACK DIMENSIONS

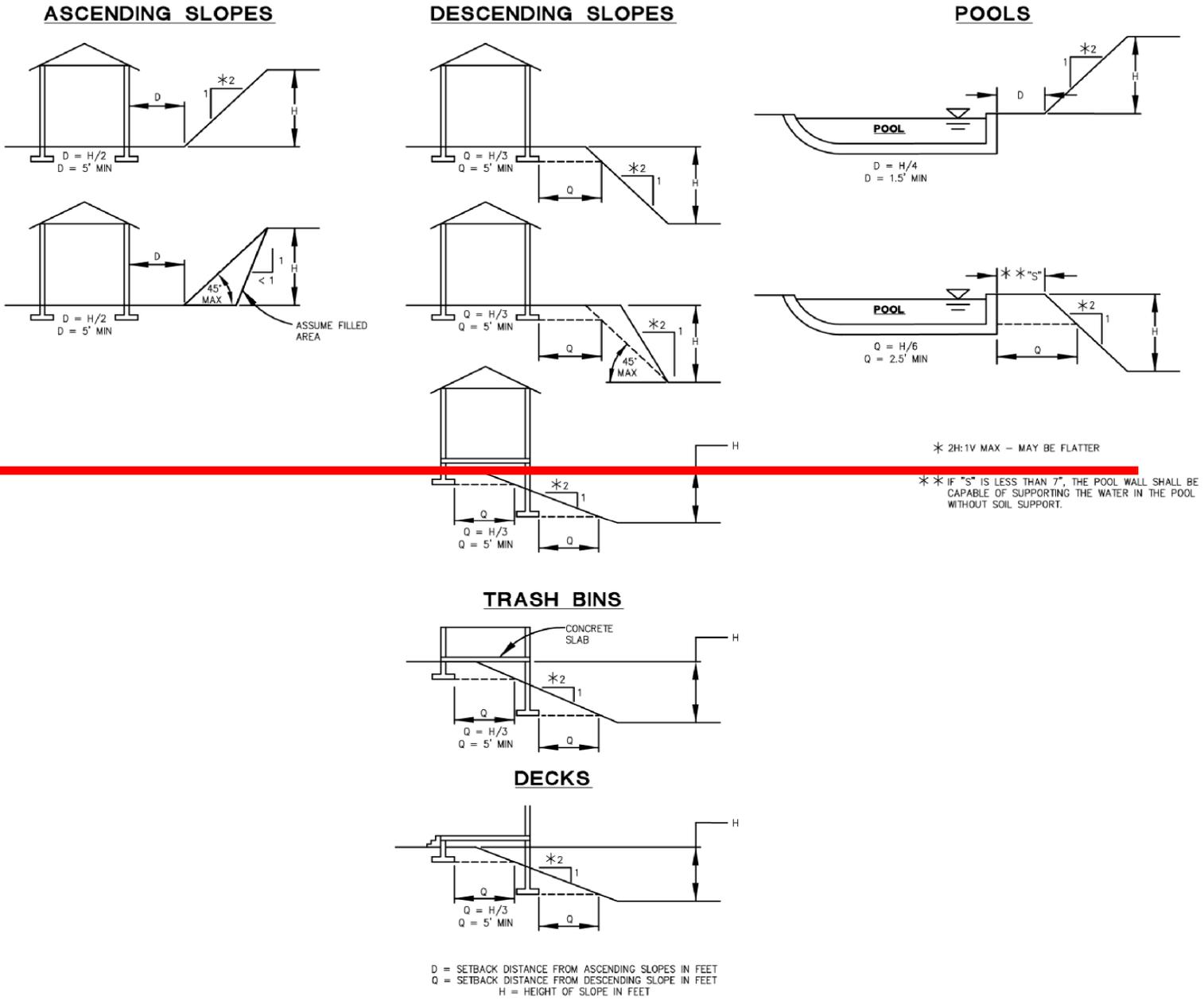


FIGURE 3b: ALTERNATE APPROVED SETBACK DIMENSIONS
NOT DRAWN TO SCALE

5.2.4 Mass Pad Grading

"Mass pad grading" (also known as mass lot grading) means the grading or disturbance of the surface of any lot or parcel more than the percentage specified below for the size of the lot or parcel in question:

Percentage (%) of land area disturbed	Parcel size (Square feet)
80	Less than 6,000
60	6,000-19,999
50	20,000-43,559
30	43,560-87,120
20	Greater than 87,120

Mass pad grading is usually, but not always, associated with subdivisions in which, the grading of all lots is more efficiently done at one time. Also, due to the terrain encountered in the County, mass pad grading may be necessary to create adequately-drained, near-level building sites and to provide for adequate access to these sites.

5.2.4.1 Basic Principles

A. The volume of grading shall be limited to that necessary to accomplish the proposed development. It is the intent of this section, consistent with the *General Plan*, that all grading shall reflect the natural gradient and contours of the site, to the greatest extent possible.

B. Grading shall be designed to minimize the creation of extensive, artificial banks or terraces which may be visible from public streets or other public views.

C. Grading shall conform to the design standards provided in this manual unless demonstrated through adequate analysis and report ~~that an alternate design can provide a stable slope that avoids severe erosion and other hazards.~~

D. To the extent that it is consistent with sound engineering practices and the need to provide proper drainage and roadway configuration, pad elevations shall be determined with the objective to preserve native trees ~~having a trunk diameter in excess of 6 inches and~~ which are generally in good health. See also Chapter 2 for standards related to oak tree protection.

E. Cross-lot or rear-lot drainage shall generally be avoided. However rear-lot drainage can be utilized when it reduces the rear-lot vertical difference between adjacent lots. When rear-lot drainage is proposed, a properly designed drainage system shall be installed to collect drainage on each lot. When cross lot drainage does occur, it shall be contained within dedicated drainage easements. This drainage shall be conveyed via closed conduit or v-ditch, to either a natural drainage course of adequate size or an appropriately sized storm drain system within the public roadway ~~unless exceptions are provided by an approved drainage study.~~

5.2.4.2 Contour Grading

- A. **Front Yards:** In order to minimize a "stair step" effect on streetscapes in padded lot areas, the transitional slope areas along the side lot lines in the front yards shall be softened by reducing the slope or by contouring the top and toe of the slope into the front yards of each unit. Front yard landscaping shall be required to be installed by the subdivider in areas where mass pad grading is combined with a build-out program.
- B. **Rear Yards:** In order to allow for a maximum of usable rear yard, and to provide proper drainage between lots, contour grading shall not be required along rear lot lines nor along side lot lines in those areas which are not visible from a public street.

5.2.4.3 House Construction

The Building Official, at final inspection for any house, shall verify that pad slopes and drainage substantially conform to approved plans.

5.2.4.4 Subsequent Construction

For mass pad graded lots on which homes have been built, and which are subject to County permit issuance for construction of a secondary structure, including but not limited to, pools, gazebos, etc., evidence of conformance to the original lot drainage pattern shall be provided as part of the building permit for secondary structures, or a revised lot drainage plan shall be submitted for review and approval. A revised drainage plan shall provide for positive, controlled lot drainage. These shall be subject to the final sign-off by the Director of the department issuing the permit.

5.2.5 Retaining Wall Design and Construction

5.2.5.1 Overview

For the purposes of this section, retaining walls are classified into three general categories, each representing retaining walls of similar height of retained earth or similar loading conditions. The definitions which follow should be read carefully before determining a retaining wall's category. After the retaining wall has been categorized, the design requirements or information to be included with the calculations or plans submitted for permit can be obtained from the "requirement" table which follows. Category "I" walls are exempt and do not require a building permit. Otherwise, the following information is applicable to the design and construction of all retaining walls in the County. Example engineering drawings to illustrate typical retaining wall construction details to be included in the plans are shown in section 5.2.6 "Retaining Wall Design Checklist and Examples." (Note: Retaining walls are subject to the setback and other requirements of the County's Ordinance Codes, the *General Plan*, Planned Developments, etc.) For the purposes of this section, snow on ground loads of 20 psf (pounds per square foot) or less need not be considered as a surcharge load. The heights of all walls shall be measured from the bottom of the footing.

5.2.5.2 Retaining Wall Categories

A. Category I: Walls which meet *all* of the following are exempt from getting a permit:

1. Retain less than four vertical feet of earth measured from the bottom of the footing;
2. Have a finish grade above and below the wall sloping less than 5:1 (five horizontal to one vertical);
3. Do not impound Class I, II, or III-A liquids as those liquids are defined in the "California Building Code" (CBC).

Note: Retaining walls that meet all of the above criteria, but that are built on the property line, or that are within a perpendicular distance from the property line equal to the height of the exposed wall face, shall not be constructed of wood.

B. Category II: Walls retaining between four feet and 10 feet of earth (including tiered walls retaining a combined total of no more than 10 feet of earth) and Category I walls on a property line that support a lateral load imposed by a six foot high solid fence (now or proposed for the future).

C. Category III:

1. Walls that retain more than 10 feet of earth, or are affected by adverse geotechnical conditions.

- ~~2. Retaining walls and retaining wall systems designed with complex configuration or construction, including segmental, stacked, and “rockery” walls, walls designed with geogrid soil reinforcing, and tiered walls that retain more than 10 feet of earth. This category also includes unconventional or proprietary walls, such as Keystone or Earthstone, where ICG approval requires special inspection or other construction review.~~
- ~~3. Walls located within a County-maintained road right-of-way are subject to review and approval by DOT, and shall be designed in accordance with the current editions of the American Association of State Highway and Transportation Officials (AASHTO) “Bridge Design Specifications”, or State of California Department of Transportation (Caltrans) “Bridge Design Specifications”, “Bridge Design Aides”, and “Bridge Details”.~~

5.2.5.3 Design Requirements

~~A. Design requirements for the non-exempt categories of retaining walls are outlined in the following table and described below. Any required geotechnical documents shall address the loading conditions and recommend design soil parameters for the type of retaining wall(s) proposed.~~

Requirements	1	2	3	4	5	6	7
Category II		X	X	X	X	X	X
Category III	X			X	X	X	X

- ~~1. Geotechnical report: A geotechnical report shall be prepared consistent with this manual by a design professional qualified to address all applicable geotechnical issues.~~
- ~~2. Site Observation: A site observation shall be made, or equivalent information obtained, by the wall designer (i.e. a design professional, or landowner as allowed under this manual) to determine the site conditions for which the wall is designed. The wall designer shall document the observations in a report which shall attest that:

 - ~~a. Visible or known adverse geotechnical conditions are not present and conditions applicable to Category III retaining walls do not apply, and~~
 - ~~b. The assumptions used in the wall design are adequate and appropriate for the observed conditions.~~
 A geotechnical report may be submitted in lieu of a site observation.~~
- ~~3. Minimum Equivalent Fluid Pressure: In the absence of soil design parameters from a Geotechnical Report, the design may use the values provided in Table 1.~~

Table 1: Allowable Foundation and Lateral Pressure Values

Classification of Material	Allowable Foundation Pressure PSF	Lateral Bearing PSF/ft of depth	Coeff. of lateral sliding	Total Unit Weight of Soil γ_{tot} (lb./cu. ft.)	Unit Weight of Equivalent Fluid γ'_{w} (lb./cu. ft.)	
					Level Backslope	2:1 Backslope
1. Crystalline Bedrock	4000	1200	0.70	100	30	50
2. Sedimentary and Foliated Bedrock	4000	400	0.35	100	30	50
3. Sandy Gravel and/or Gravel (GW and GP)	2000	200	0.35	100	35	60
4. Sand, silty Sand, clayey Sand, silty Gravel, and clayey Gravel (SW, SP, SM, SC, GM, GC)	1500	150	0.25	80	40	65
5. Clay, sandy Clay, silty Clay, and clayey Silt (CL, ML)	1000	100	*	90	70	90

*130 psf multiplied by the contact area, but not more than one half the dead load.

- a. Cantilevered walls may be designed for equivalent fluid pressures (unit weights) shown in Table 1 for the soil classification shown and having a depth equal to that of the retained earth. Any surcharges shall be in addition to the equivalent fluid pressure. Increased loads due to sloped backfill between five horizontal to one vertical (5H:1V) and two horizontal to one vertical (2:1), may be accounted for by increasing the equivalent fluid pressure to the value shown in Table 1 for 2:1 backslope.
- b. Restrained walls that retain drained earth, such as walls having buttresses or top restraint, may be designed using design parameters recommended in a geotechnical report. In lieu of such recommendations, the wall may be designed using the equivalent fluid pressures defined in Table 1 together with a uniform load equal to ten times the wall height (10H with 10 is pounds and H is measured in feet) superimposed uniformly over the height of the wall. Any surcharge loads shall be in addition to this composite pressure distribution.

~~c. Alternatively, the lateral earth pressure imposed on cantilevered or restrained retaining walls may be determined by using Rankine (assumes no wall friction or soil cohesion) or Coulomb or other generally accepted theory.~~

~~4. Seismic (Earthquake) Loads: Seismic forces shall be specifically addressed:~~

- ~~a. If the exposed wall face is 12 feet or more, or if the wall is a "rockery" wall,~~
- ~~b. If the wall is supporting a structure or the surcharge from a structure; or if the wall is protecting a structure other than single family residences, private garages, sheds, or agricultural buildings,~~
- ~~c. If the wall is protecting a required exit or is part of a structure having a "Category III" or "Category IV occupancy" as defined in the "California Building Code",~~
- ~~d. If required by the design professional in responsible charge, the wall designer, or the Director of the department issuing the grading permit.~~

~~At the discretion of the design professional, the seismic thrust may be evaluated with the pseudo-static Mononabe-Okabe equation, or walls may be designed using the approximated value of the resultant seismic force = $14H^2$ positioned 0.6H above the top of the footing or base, where "H" is the retained earth height.~~

~~In addition, Mechanically Stabilized Earth wall designs shall include the horizontal inertia force of the reinforced fill. The Mononabe-Okabe inertia force equation may be used, or, walls may be designed using the approximated value of the inertia force = $20HL$ positioned 0.5H above the base, where "H" is the retained earth height and "L" is the depth of reinforced fill.~~

~~5. Minimum Design Requirements:~~

- ~~a. Retaining walls shall be designed to withstand lateral earth and/or fluid pressures, including any live and dead load surcharge, the self weight of the wall, and earthquake loads; all in accordance with accepted engineering practice, the CBC, and all applicable IGC or IGBO Legacy Evaluation Reports.~~
- ~~b. Walls shall be designed for the minimum factors of safety shown in Table 2. Factors of safety against sliding and overturning failure under combined loading (seismic load included) may be reduced to 75 percent of the static safety factors.~~
- ~~c. Friction force and passive soil pressure shall not be combined to resist sliding unless technical justification is provided and approved. Passive soil pressure within the top 12 inches or above the frost line shall be neglected.~~

- ~~d. Concrete retaining walls designed to resist earthquake forces shall be constructed of concrete with a minimum strength of 3000 pounds per square inch (psi).~~
- ~~e. Rockery walls shall not have chinking on the exposed face and the minimum weight of cap rocks shall be 200 pounds.~~
- ~~f. Drainage behind walls shall be provided by a 12-inch wide (minimum) continuous blanket of free-draining granular material equivalent to Caltrans Class 2 permeable material extending from the base of the wall to within one foot of the ground surface. The top one foot of backfill shall consist of material capable of reducing the potential for surface water to enter the wall drain. Water collected behind the wall shall be drained by weep holes, open joints or rigid perforated pipes (perforations down) placed at the base of the wall within the permeable material. Pipes shall be sloped to provide positive drainage and be connected to solid pipes at the ends of the wall to convey drainage to daylight, storm drain or other suitable disposal location. Additional drains to divert surface water shall be placed wherever water can be impounded by the walls. Surface water drains shall not be connected to wall back drains.~~
- ~~g. Restrained walls shall not be backfilled until restrained connection and supporting elements are completed or temporary shoring is in place.~~

Table 2: External Stability Factors of Safety	
Failure Mode	Factor of Safety
Soil Bearing Capacity	2.0-3.0
Sliding	1.5
Overturning	1.5
Overturning of MSE* walls	2.0
Supporting elements of a restrained wall	1.5
Global stability	1.5

* Mechanically Stabilized Earth

- ~~6. Engineered Drawings: Plans submitted for permit shall be drawn to scale with sufficient detail to describe the nature and extent of the work proposed. They shall accurately reflect the results of the wall design calculations and shall be stamped and wet signed by the design professional. Submitted plans shall include:

 - ~~a. A plan showing the location of the proposed wall with respect to existing structures and property lines and easements;~~
 - ~~b. A plan showing a plan view of the wall itself with top of wall and bottom of wall elevations and finish grade contours;~~
 - ~~c. Typical cross section(s);~~~~

- d. Elevation view(s) if the wall has a complex configuration with steps, differing lengths and locations of steel reinforcing or wall thickness, or if the wall has varying geogrid layer locations and lengths;
- e. Notes specifying required or desired special inspections and structural observations together with compaction and other soil test requirements.

Information on the submitted drawings shall be complete and legible to facilitate the plan review and inspection process. Examples of drawings illustrating various wall types and materials and typical plan information to be shown are in section 2.5.6 “Retaining Wall Design Checklist and Examples” at the end of this Chapter, as follows:

Drawing #1	Pictorial glossary of retaining wall types
Drawing #2	Cross section of a Category A exempt retaining wall
Drawing #3	Cross section of a restrained retaining wall constructed of reinforced concrete
Drawing #4	Cross section of a cantilevered retaining wall constructed of reinforced masonry
Drawing #5	Cross section of a gravity and Mechanically Stabilized Earth retaining wall with segmental wall face
Drawing #6	Elevation of a stepped segmental wall with grid layers
Drawing #7	Cross section of terraced wall system
Drawing #8	Plan view of retaining wall
Drawing #9	Retaining wall type: Rockery Typical Section
Drawing #10	Retaining wall type: Rockery Partial Typical Profiles

7. Inspections: The schedules in the following tables provide an abbreviated description of the minimum inspections required for retaining walls:

- a. Inspections by County staff:

Table 4 Reinforced Concrete Retaining Walls

Inspection	Scope of Inspection
1 st	Footing pad and size, key size, reinforcement, soil condition at toe. Discuss special inspection procedures (if applicable).
2 nd	Prior to concrete pour. Wall forms and reinforcement (must be accessible). Anchor bolts and hardware placement.
3 rd	Drain(s), wall waterproofing, restrained support or temporary shoring per design professional. Discuss drain rock and backfill compaction procedures.
Final	Drain to daylight. Weep holes, restrained support, erosion control, backfill compaction report, special inspection report.

Table 5: Block (Masonry) Retaining Walls

Inspection	Scope of Inspection
1 st	Footing pad and size, key size, reinforcement, soil condition at toe. Discuss special inspection procedures (if applicable).
2 nd	Four foot lift, prior to grout pour. Block, mortar joints, reinforcement and grout cells
3 rd	Top lift, prior to last grout pour. Block, mortar joints, reinforcement and grout cells. Anchor bolts and hardware placement.
4 th	Drain(s). Wall waterproofing. Restrained support or temporary shoring per design professional. Discuss drain rock and backfill compaction procedures.
Final	Drain to daylight. Weep holes, restrained support, erosion control, backfill compaction report, special inspection report.

Table 6: Segmental or MSE Retaining Walls

Inspection	Scope of Inspection
1 st	Footing/leveling pad. Batter (if any). Discuss Special Inspection procedures (if applicable), drain(s), and backfill compaction.
2 nd	Lowest layer of grid or third course of modules. Permeable drain material. Batter. Backfill compaction report. Grid, type, length, taut.
3 rd	Mid layer of grid or mid course of modules. Permeable drain material. Batter. Backfill compaction report. Grid, type, length, taut.
Final	Drain to daylight. Cap layers, batter, erosion control, backfill compaction report, special inspection report.

Table 7: ~~Rockery Retaining Walls~~

Inspection	Scope of Inspection
1st	Footing/leveling pad. Batter (if any). Discuss Special Inspection procedures (if applicable), drain(s), and backfill compaction.
2nd	Mid-height of wall. Permeable drain material. Batter. Backfill compaction report
Final	Drain to daylight. Cap layers, batter, erosion control, backfill compaction report, special inspection report.

~~b. Special Inspections: Where or when required, the following special inspections shall be performed by the designer or a certified inspector acceptable to the County; and testing shall be performed by a qualified testing agency acceptable to the County.~~

Table 8: ~~Special Inspection and Testing~~

Item	Continuous	Periodic
Soil Compaction		X
Reinforced Concrete	X	
Structural Masonry	X	
Shotcrete	X	
Segmental or Rockery Wall placement		X
Grids and Tie Backs		X
Gabion or Grib wall		X
ICC or ICBO Legacy Report	As Specified	As Specified
Structural Observation	As Specified	As Specified

- ~~1. Compaction testing of soil backfill (excluding self-compacting drain rock) shall be per the designer's specifications but not less than every 24 inches of lift and every 50 lineal feet of length.~~
- ~~2. Segmental or Mechanically Stabilized Earth (MSE) walls shall be constructed under the observation of the designer, and shall include review of the footing pad, base course and geogrid placement, face batter, wall facing cavity (if any) backfill, review of compaction testing, and overall compliance with the plans.~~
- ~~3. Rockery walls shall be constructed under the observation of the designer, and shall include review of the footing pad, rock and backfill placement, review of compaction testing, and overall compliance with the plans.~~

- ~~4. Soil characteristics shall be observed by the designer or the geotechnical engineer to confirm that they are consistent with the assumptions used in the wall design.~~
- ~~5. Compaction and Special Inspection or Structural Observation reports shall be provided before or at the time of inspection by the County. Reports not prepared by the designer shall be reviewed and approved by the designer before being provided to the County. All final reports shall be provided to the County before the final inspection by the County. On projects where a Design Professional in Responsible Charge has been designated by the owner, that person shall review and approve or accept all reports before they are provided to the County.~~

5.2.6 – Retaining Wall Design Checklist and Examples

5.2.6.1 Index

- ~~Checklist of information to be provided for permit~~
- ~~Drawing #1 – Pictorial Glossary of Retaining Wall Types~~
- ~~Drawing #2 – Category A, Exempt Wall~~
- ~~Drawing #3 – Retaining Wall Type: Restrained~~
- ~~Drawing #4 – Retaining Wall Type: Cantilever~~
- ~~Drawing #5 – Retaining Wall Type: Mechanically Stabilized Earth With Segmental Wall Face~~
- ~~Drawing #6 – Elevation of a Stepped Segmental Wall with Grid Layers~~
- ~~Drawing #7 – Terraced Wall System~~
- ~~Drawing #8 – Plan View of Retaining Wall~~
- ~~Drawing #9 – Rockery Wall Typical Section~~
- ~~Drawing #10 – Rockery Walls, Typical Elevations~~
- ~~Drawing #11 – Surcharge Loading Examples~~

5.2.6.2 ~~Checklist of Information to be Provided for Permit~~

~~The drawing details which follow are intended primarily to illustrate many of the different types of retaining walls which may be designed for a particular site. These details show most, but not all, of the information required to be detailed on plans or calculations submitted for permit. The following is intended to assist the designer in preparation of a complete permit application, but is not intended to replace the independent judgment of and analysis by the wall designer. Much of the information in this checklist is covered in this manual in section 5.2.5.3 “Design Requirements.”~~

- ~~A. **Signatures:** All calculations, reports, and plans included in applications for permit shall be stamped and wet signed by the designer.~~
- ~~B. **Design parameters:** An analysis of the site conditions is required for the design of all retaining walls. This may be in the form of a Geotechnical Report or a site visit by the designer or an authorized representative. If the design parameters are determined by the designer, notes in the design calculations or a statement by separate letter shall be submitted that describes the site conditions encountered and justifies the selection of the design parameters used.~~
- ~~C. **Global Stability:** The designer shall address the possibility that slip plane failure may affect walls constructed on slopes. The calculations provided as part of the permit application shall document that the wall will meet established standards of stability.~~
- ~~D. **Construction Plans:** The wall construction requirements determined by the design analysis shall be clearly shown on the construction plans. Engineering features described in the calculation report, shall be shown on the plans or the plans shall have a prominent reference to the location of this information. If a Geotechnical Report was prepared by a design professional other than the wall designer, a letter from that engineer confirming that the design parameters used in the wall design are consistent~~

- with the recommendations in the Report shall be submitted with the permit application.
- ~~E. **Wall profile elevations** shall be included where the walls are constructed on undulating terrain or where different reinforcing schedules or geogrid lengths or types are required to accommodate varying wall heights.~~
 - ~~F. **Plot and/or Site Plans** drawn to scale shall be included with the construction plans and shall show the location of the wall(s) with respect to easements, property lines, and structures. Top of wall elevations and finish grade elevations shall be shown at appropriate intervals or steps along the length of wall.~~
 - ~~G. **Special Inspections and/or structural observations** shall have prominent notes placed on the plans detailing special inspection and/or structural observation requirements.~~
 - ~~H. **Compaction requirements** for backfill material shall be described on the plans. The plans shall clearly show the geometry, placement methods, and density testing requirements for backfill material installed adjacent to the wall. Mechanical compaction is required of backfill material.~~
 - ~~I. **Concrete:** The plans shall specify the required concrete strength (2500 psi minimum, 3000 psi minimum for walls resisting seismic loads) and any applicable special mixing requirements. Concrete strengths over 2500 psi require onsite testing.~~
 - ~~J. **Concrete Masonry Units:** The plans shall show the type of concrete masonry units to be utilized (e.g., ASTM C90), the type and strength of grout, the type of mortar and how it is struck, the design strength of the wall (f'm), and whether or not special inspection is required.~~
 - ~~K. **Reinforcing Steel:** The plans shall show the strength and size of reinforcing steel, and its placement relative to the edges of wall stems and footings.~~
 - ~~L. **Mechanically Stabilized Earth** walls shall include the identity of the manufacturer, the type of geogrid material to be used, and the placement locations of these geogrid materials clearly shown on submitted plans. Proprietary facings typically have special Code approvals (ICC Evaluation Reports) for their use. The designer shall include requirements of applicable Code approvals for propriety facings (i.e., special inspections) on the plans.~~
 - ~~M. **Rockery Walls** constructed in the County have special requirements that shall be shown on the plans, including a seismic design analysis and special inspection or structural observation of the wall construction by the designer, a minimum cap rock size of 200 pounds, and no chinking on exposed faces.~~

5.2.6.3 Drawings of Different Types of Retaining Walls

The following drawings illustrate the typical minimum information to be shown on plans submitted for permit for various types of retaining walls:

5.2.5 Retaining Wall Design and Construction

The purpose of this section is to provide basic information to assist applicants in obtaining permits, ensuring proper design, ensuring proper construction of the wall system, and in getting the proper inspections.

5.2.5.1 Governing Standards and Guidelines

The retaining walls shall be designed in accordance with the applicable chapters and appendices of the latest edition of the California Building Code in addition to the applicable provisions provided in this section. All retaining walls requiring a permit are shall consider earthquake loading in accordance with the applicable chapters of the building code.

A Reference Guide is available at the County department responsible for issuing the permit.

5.2.5.2 Permit Requirements

Construction of retaining walls requires a permit and is regulated by local building and zoning codes and this manual.

Exception: Walls retaining less than four feet of earth measured from the bottom of the footing, and that have a finish grade above and below the wall sloping less than 5:1 (five horizontal to one vertical) and do not impound Class I, II, or III-A liquids as those liquids are defined in the "California Building Code" (CBC), are exempt from permit. Walls built on the property line or within a perpendicular distance from the property line equal to the height of the exposed wall face shall not be constructed of wood.

All walls located within a County-maintained road right-of-way are subject to review and approval by DOT, and shall be designed in accordance with the current editions of the American Association of State Highway and Transportation Officials (AASHTO) "Bridge Design Specifications", or State of California Department of Transportation (Caltrans) "Bridge Design Specifications", "Bridge Design Aides", and "Bridge Details".

5.2.5.3 Design Requirements

All permitted retaining walls require a soils investigation in accordance with the California Building Code.

Exception: Walls or a combination of walls constructed of concrete or masonry that are less than 10 feet in height. Soil design parameters and requirements for site observation shall be in accordance with California Building Code.

Seismic design is required for all permitted retaining walls unless exempted by exception in the California Building Code. However, all rockery walls require a seismic analysis. Seismic design may be submitted in accordance with the FHWA methods provided in the referenced standard provided local parameters are used in the design. At the discretion of the design professional, the seismic thrust may be evaluated with the pseudo-static Mononabe-Okabe equation, or walls may be designed using the approximated value of the resultant seismic force = $14H^2$ positioned 0.6H above the top of the footing or base, where "H" is the retained earth height. In addition, Mechanically Stabilized Earth wall designs shall include the horizontal inertia force of the reinforced fill. The Mononabe-Okabe inertia force equation may be used, or, walls may be designed using the approximated value of the inertia force = $20HL$ positioned 0.5H above the base, where "H" is the retained earth height and "L" is the depth of reinforced fill.

Minimum Design Requirements:

- A. Retaining walls shall be designed to withstand lateral earth and/or fluid pressures, including any live and dead load surcharge, the self weight of the wall, and earthquake loads; all in accordance with accepted engineering practice, the CBC, and all applicable ICC or ICBO Legacy Evaluation Reports. Snow on ground surcharge loads of 20 psf or less may be ignored.
- B. All retaining wall heights are measured from the bottom of the footing to the top of the wall.
- C. Walls shall be designed for the minimum factors of safety shown in Table 1. Combined loading factors shall be in accordance with the California Building Code.
- D. Justification shall be provided for lateral pressure resistance used in the top 12 inches or above frost line is used.
- E. Concrete retaining walls designed to resist earthquake forces shall be constructed of concrete with a minimum strength as specified in ACI 318 and the California Building Code. ~~of 3000 pounds per square inch (psi).~~
- F. Rockery walls shall not have chinking on the exposed face and the minimum weight of cap rocks shall be 200 pounds.
- G. Drainage behind walls shall be provided in accordance with the California Building Code.
- H. Restrained walls shall not be backfilled until restrained connection and supporting elements are completed or temporary shoring is in place.

Table 1: External Stability Factors of Safety **	
<u>Failure Mode</u>	<u>Factor of Safety</u>
<u>Soil Bearing Capacity</u>	<u>2.0-3.0</u>
<u>Sliding</u>	<u>1.5</u>
<u>Overturning</u>	<u>1.5</u>
<u>Overturning of MSE* walls</u>	<u>2.0</u>
<u>Supporting elements of a restrained wall</u>	<u>1.5</u>
<u>Global stability</u>	<u>1.5</u>

* Mechanically Stabilized Earth

** The above safety factors may be used with the various load combinations of the California Building Code

5.2.5.4 Plan Check Submittal Requirements

- A. All plans must be drawn to scale. Two copies of all plans, calculations and supporting documents are required for submittal. Designed professional prepared material shall be stamped and wet signed;
- B. Plot Plan indicating the location, accurate width of the wall, length and height of the wall, lot drainage patterns, top and bottom of wall elevations and finish grade contours, and the distance to the property line, easements and adjacent structures on the lot. Refer to Section 5.2.3 for setback requirements;
- C. Typical cross section(s);
- D. Elevation views for clarification of complex wall configurations;
- E. Special Inspection and structural observation requirements shall be listed on the Plan Title Sheet;
- F. The calculations shall reference the design parameters and soil type used in the design if a soils report is not provided;
- G. If the manufacturer provides a "Standardized Design", provide the "Standardized Manual with a Design Professional's wet signed stamp on the cover sheet. The applicant shall "Highlight" on the plan the wall to be used for construction. All the provisions of the standardized wall mustshall apply including slope configuration and material type.
- H. A soil investigation report providing the design parameters for use in the design of the walls, as required in 5.2.5.3.
- I. One copy of the latest Design Manual and the ICC-ES Report if the wall is a manufactured product (i.e. keystone wall, anchor wall, etc.).

5.2.5.5 Construction

Retaining Walls must be constructed per the plans, the approved engineering calculations; and where applicable the manufacturer's installation manual, and the latest ICC-ES Report.

5.2.5.6 Inspections

The following inspections will be required during the retaining wall construction.

Inspections by County staff: The schedules in the following tables provide an abbreviated description of the minimum inspections required for retaining walls

Segmental or MSE Retaining Walls

<u>Inspection</u>	<u>Scope of Inspection</u>
<u>1st</u>	<u>Footing/leveling pad. Batter (if any). Discuss Special Inspection procedures (if applicable), drain(s), and backfill compaction & testing.</u>
<u>2nd</u>	<u>Lowest layer of grid or third course of modules. Permeable drain material. Batter. Backfill compaction report. Grid, type, length, taut.</u>
<u>3rd</u>	<u>Mid layer of grid or mid course of modules. Permeable drain material. Batter. Backfill compaction report. Grid, type, length, taut.</u>
<u>Final</u>	<u>Drain to daylight. Cap layers, batter, erosion control, backfill compaction report, special inspection report.</u>

Rockery Retaining Walls

<u>Inspection</u>	<u>Scope of Inspection</u>
<u>1st</u>	<u>Footing/leveling pad. Batter (if any). Discuss Special Inspection procedures (if applicable), drain(s), and backfill compaction.</u>
<u>2nd</u>	<u>Mid-height of wall. Permeable drain material. Batter. Backfill compaction report</u>
<u>Final</u>	<u>Drain to daylight. Cap rocks, batter, erosion control, backfill compaction report, special inspection report.</u>

Reinforced Concrete Retaining Walls

<u>Inspection</u>	<u>Scope of Inspection</u>
<u>1st</u>	<u>Footing pad and size, key size, reinforcement, soil condition at toe. Discuss Special Inspection procedures (if applicable).</u>
<u>2nd</u>	<u>Prior to concrete pour. Wall forms and reinforcement (must be accessible). Anchor bolts and hardware placement.</u>
<u>3rd</u>	<u>Drain(s), wall waterproofing, restrained support or temporary shoring per design professional. Discuss drain rock and backfill compaction procedures.</u>
<u>Final</u>	<u>Drain to daylight. Weep holes, restrained support, erosion control, backfill compaction report, Special Inspection report.</u>

Block (Masonry) Retaining Walls

<u>Inspection</u>	<u>Scope of Inspection</u>
<u>1st</u>	<u>Footing pad and size, key size, reinforcement, soil condition at toe. Discuss Special Inspection procedures (if applicable).</u>
<u>2nd</u>	<u>Four foot lift, prior to grout pour. Block, mortar joints, reinforcement and grout cells</u>
<u>3rd</u>	<u>Top lift, prior to last grout pour. Block, mortar joints, reinforcement and grout cells. Anchor bolts and hardware placement.</u>
<u>4th</u>	<u>Drain(s), wall waterproofing, restrained support or temporary shoring per design professional. Discuss drain rock and backfill compaction procedures.</u>
<u>Final</u>	<u>Drain to daylight. Weep holes, restrained support, erosion control, backfill compaction report, special inspection report.</u>

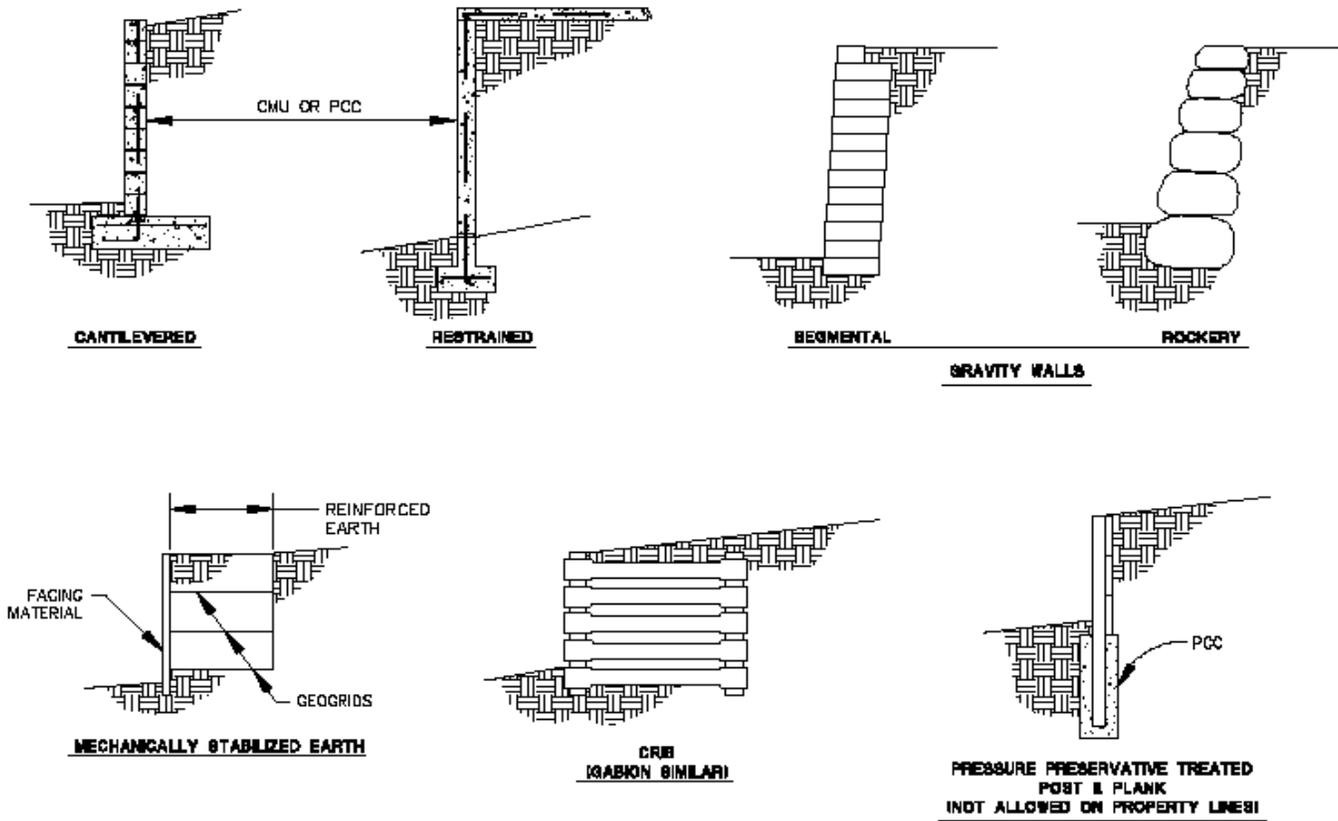
Special Inspection by Qualified Professional: Where or when required, the following special inspections shall be performed by the designer or a certified inspector acceptable to the County; and testing shall be performed by a qualified testing agency acceptable to the County. Special Inspections are in addition to the required inspections performed by County Building Inspectors.

Special Inspection and Testing		
<u>Item</u>	<u>Continuous</u>	<u>Periodic</u>
<u>Soil Compaction</u>		<u>X</u>
<u>Reinforced Concrete</u>	<u>X</u>	
<u>Structural Masonry</u>	<u>X</u>	
<u>Shotcrete</u>	<u>X</u>	
<u>Segmental or Rockery Wall placement</u>		<u>X</u>
<u>Grids and Tie Backs</u>		<u>X</u>
<u>Gabion or Crib wall</u>		<u>X</u>
<u>ICC or ICBO Legacy Report</u>	<u>As Specified</u>	<u>As Specified</u>
<u>Structural Observation</u>	<u>As Specified</u>	<u>As Specified</u>

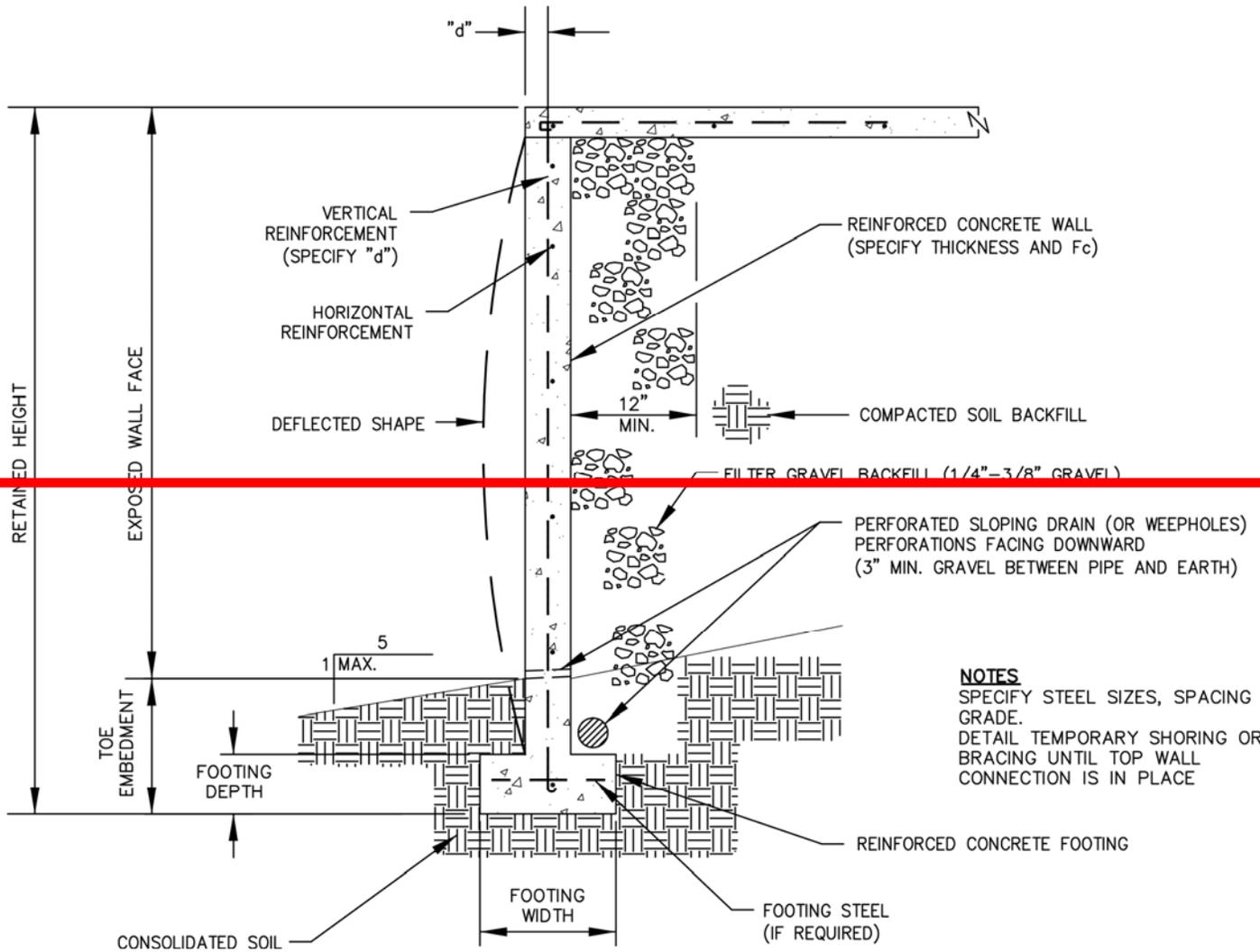
- A. Compaction testing of soil backfill (excluding drain rock) shall be per the designer's specifications but not less than every 24 inches of lift and every 50 lineal feet of length provided at an appropriate interval to verify proper compaction levels are obtained.
- B. Segmental or Mechanically Stabilized Earth (MSE) walls shall be constructed under the observation of the designer, and shall include review of the footing pad, base course and geogrid placement, face batter, wall facing cavity (if any) backfill, review of compaction testing, and overall compliance with the plans.
- C. Rockery walls shall be constructed under the observation of the designer, and shall include review of the footing pad, rock and backfill placement, review of compaction testing, and overall compliance with the plans.
- D. Soil characteristics shall be observed by the designer or the geotechnical engineer to confirm that they are consistent with the assumptions used in the wall design.
- E. Compaction and Special Inspection or Structural Observation reports shall be provided before or at the time of inspection by the County. Reports not prepared by the designer shall be reviewed and approved by the designer before being provided to the County. All final reports shall be provided to the County before the final inspection by the County. On projects where a Design Professional in Responsible Charge has been designated by the owner, that person shall review and approve or accept all reports before they are provided to the County.

5.2.5.7 Appendices

Code references and general information together with the Retaining Wall Design Checklist and Examples of different types of retaining walls as illustrated below can be found in the reference guide available at the County office responsible for issuing the permit.

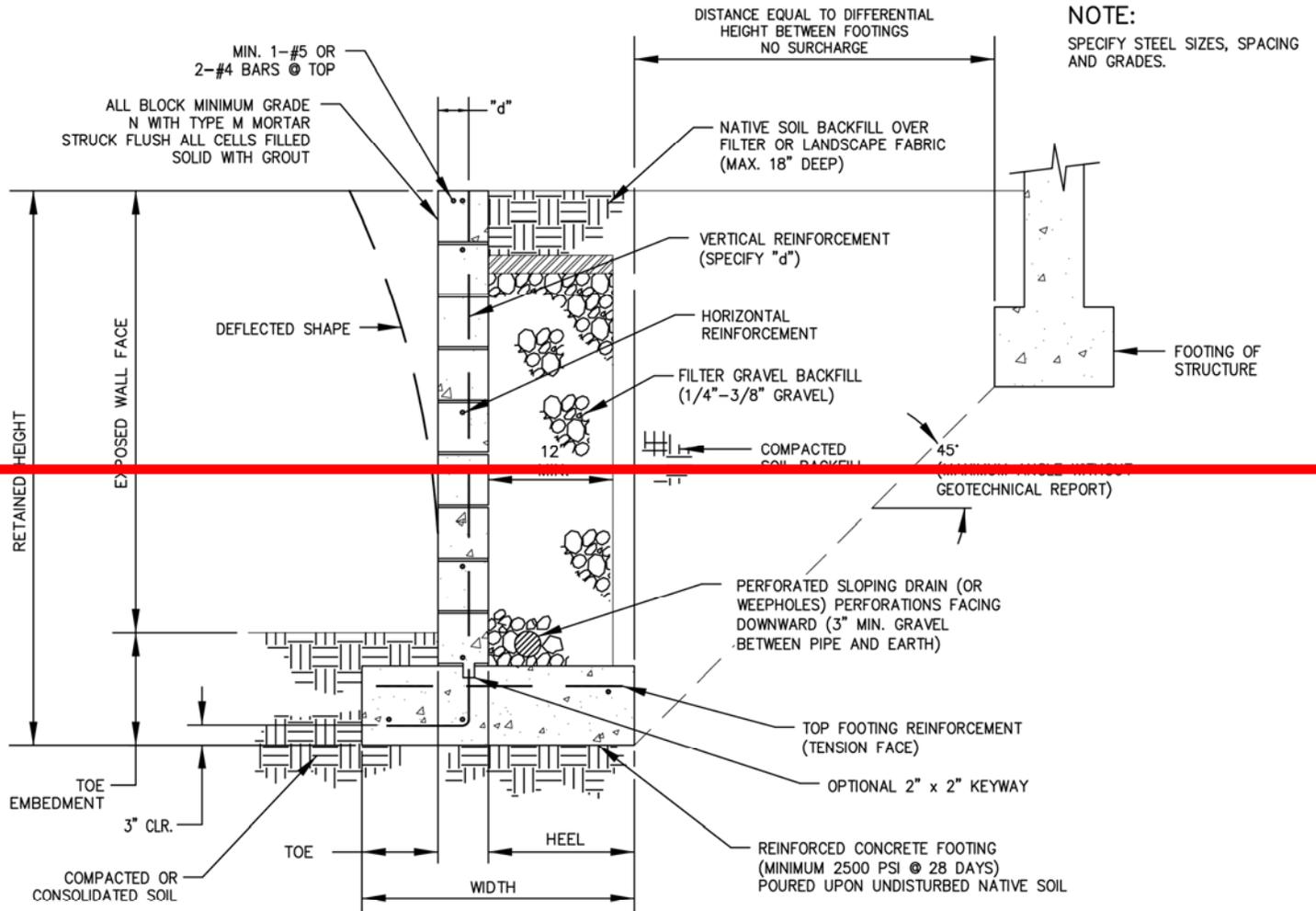


DRAWING #1
PICTORAL GLOSSARY OF RETAINING WALL TYPES
NOT TO SCALE

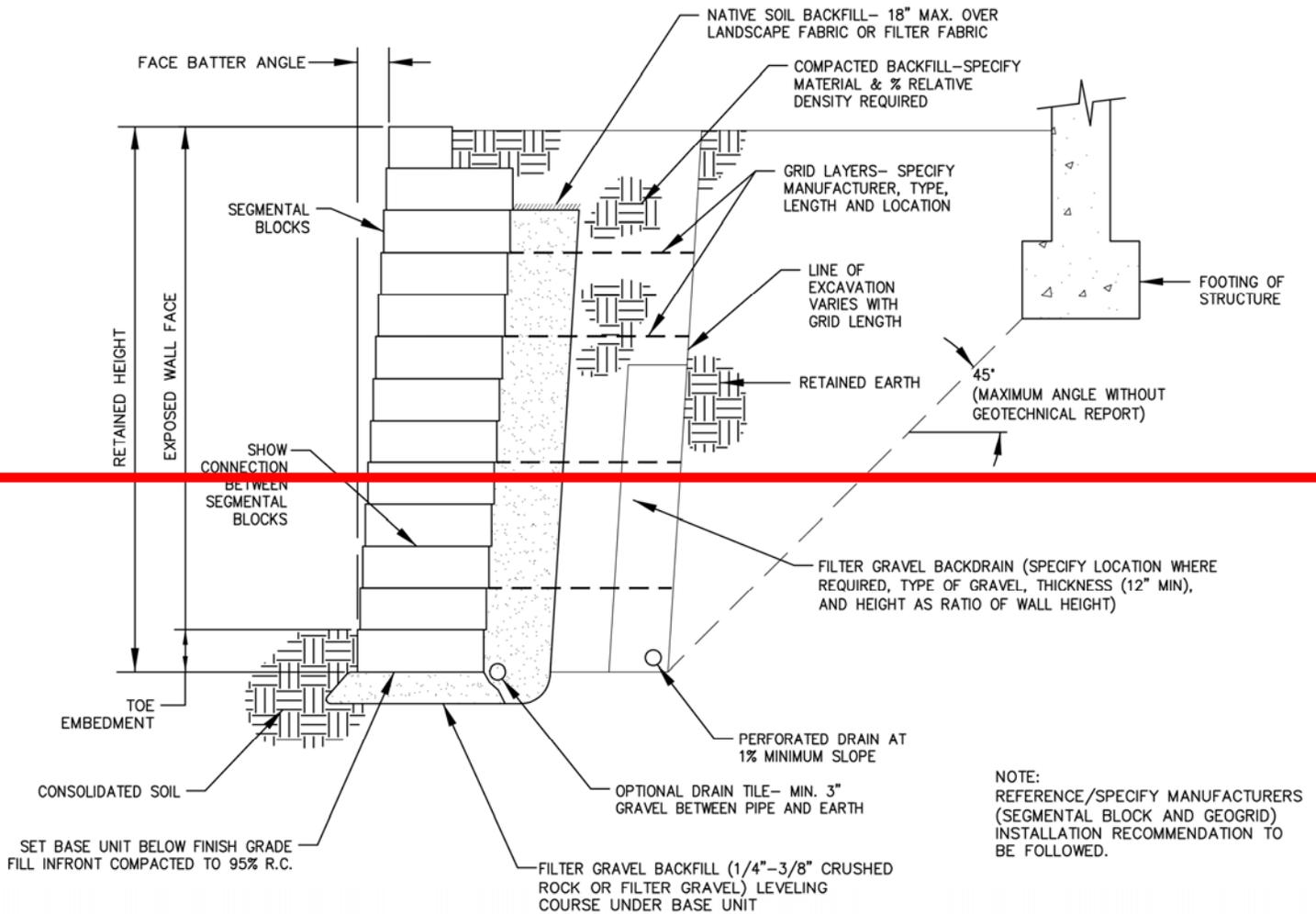


NOTES
 SPECIFY STEEL SIZES, SPACING AND GRADE.
 DETAIL TEMPORARY SHORING OR BRACING UNTIL TOP WALL CONNECTION IS IN PLACE

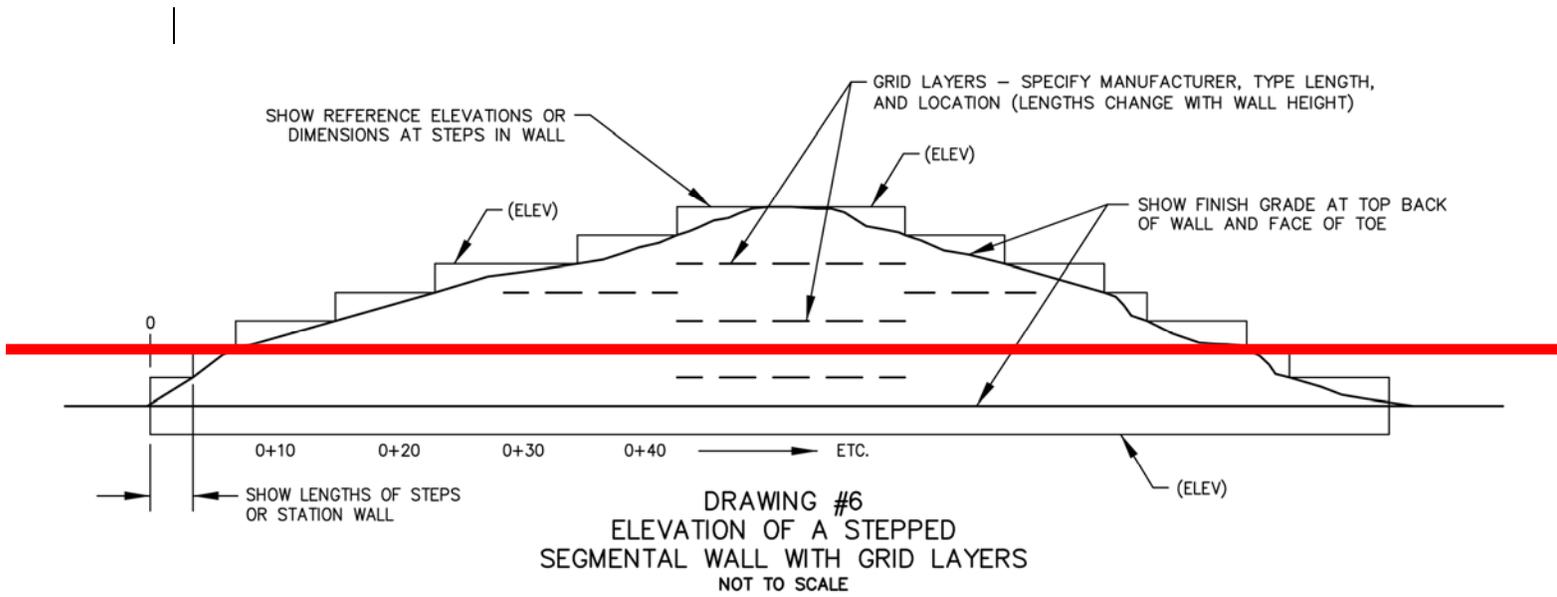
DRAWING #3
 RETAINING WALL TYPE: RESTRAINED
 MATERIAL: REINFORCED CONCRETE
 NOT TO SCALE

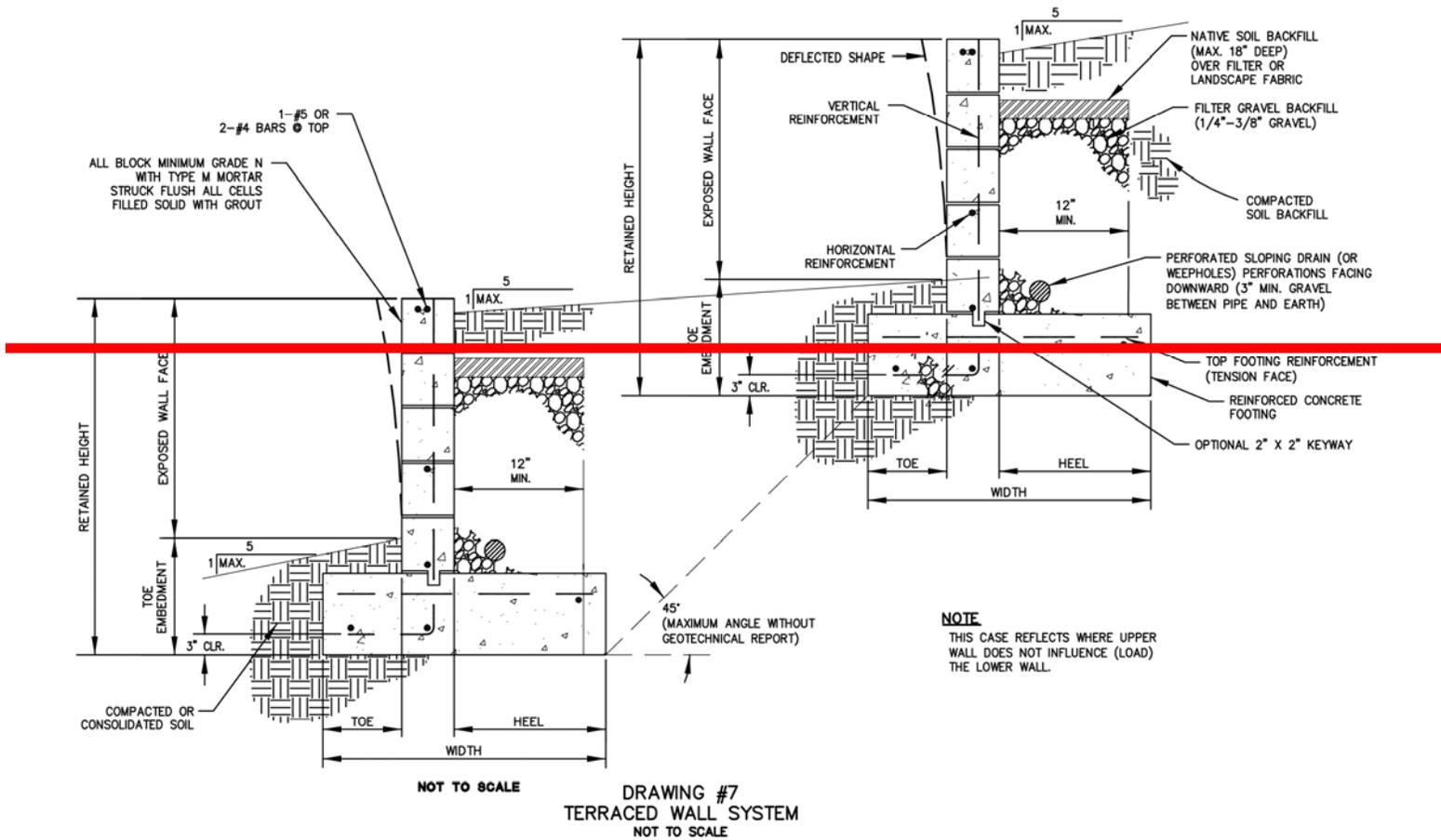


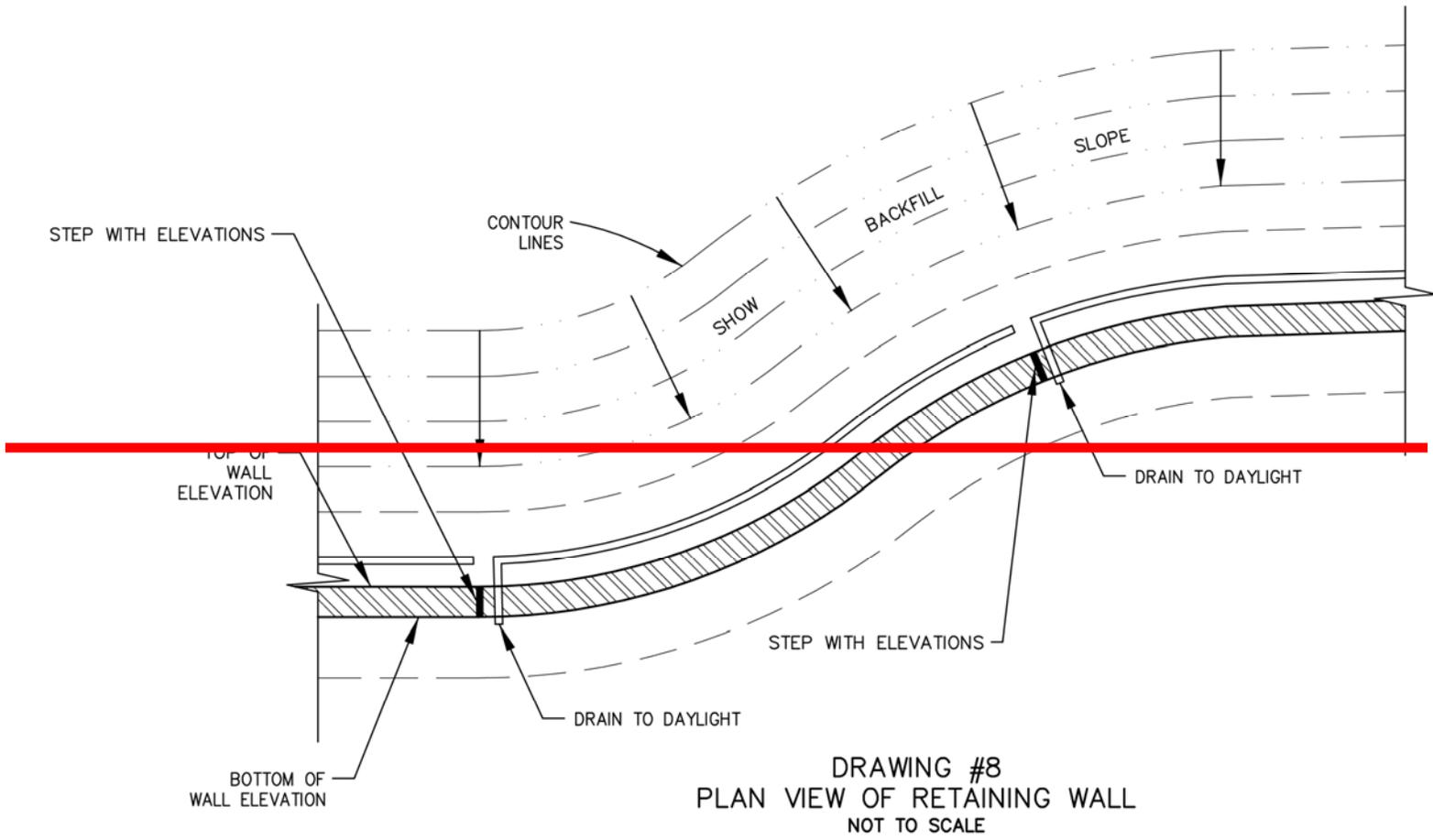
DRAWING #4
RETAINING WALL TYPE: CANTILEVER
MATERIAL: STRUCTURAL MASONRY
NOT TO SCALE

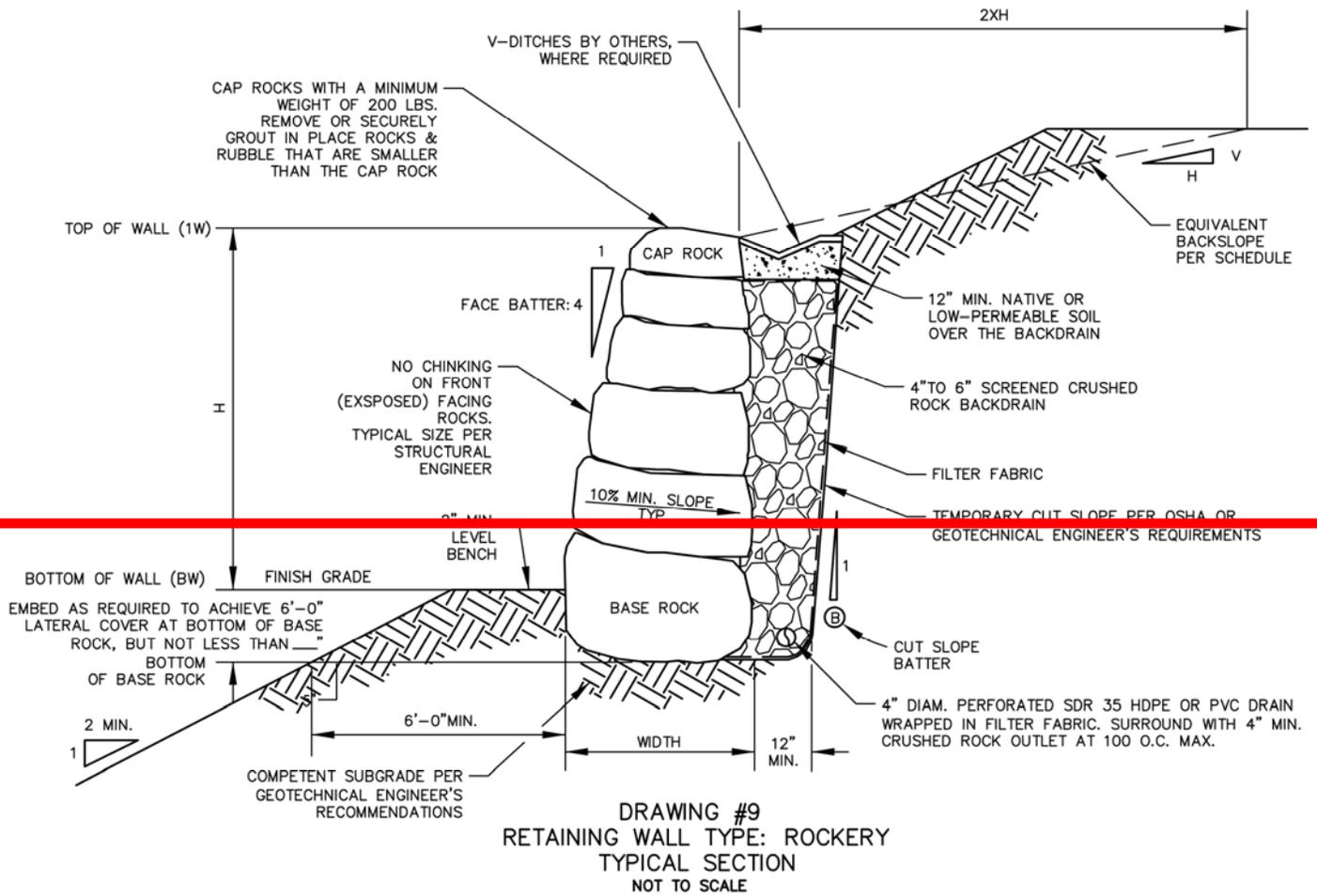


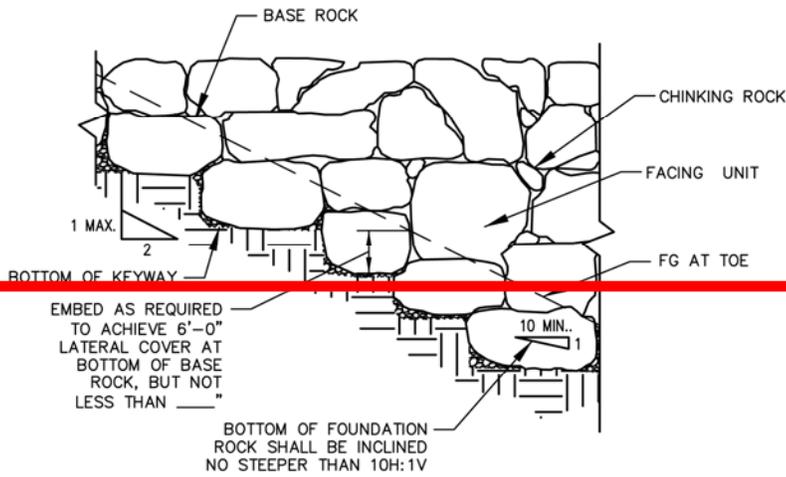
DRAWING #5
RETAINING WALL TYPE: MECHANICAL STABILIZED EARTH WITH
SEGMENTAL WALL FACE
NOT TO SCALE



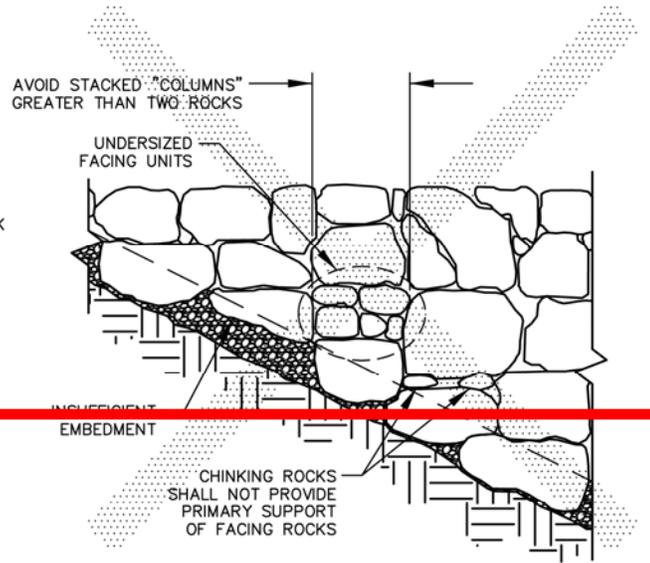






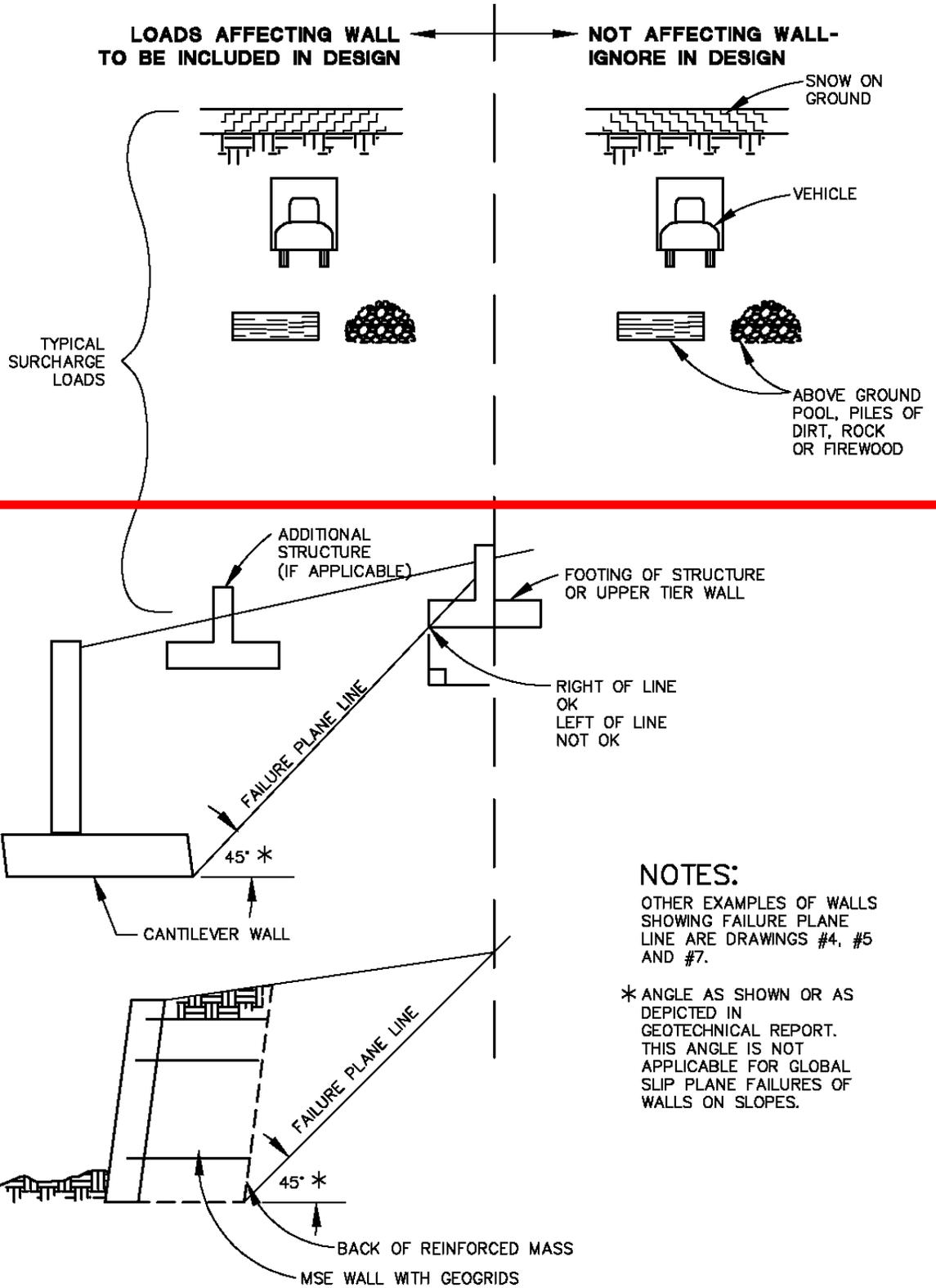


CORRECT



INCORRECT

DRAWING #10
 RETAINING WALL TYPE: ROCKERY
 PARTIAL TYPICAL ELEVATION VIEWS
 NOT TO SCALE



NOTES:

OTHER EXAMPLES OF WALLS SHOWING FAILURE PLANE LINE ARE DRAWINGS #4, #5 AND #7.

* ANGLE AS SHOWN OR AS DEPICTED IN GEOTECHNICAL REPORT. THIS ANGLE IS NOT APPLICABLE FOR GLOBAL SLIP PLANE FAILURES OF WALLS ON SLOPES.

DRAWING #11
SURCHARGE LOADING EXAMPLES
NOT TO SCALE

5.3 GRADING PERMIT APPLICATION AND PROCEDURES

5.3.1 Responsibilities

Review and regulation of grading is a joint responsibility shared between DSD, DOT, and the Agriculture Department. Depending on the project, one or more organizations may need to review the grading plan. This may include non-County agencies such as Fish and Game, Public Utilities, etc. A list of these agencies is available at DSD. The table which follows describes which department will handle the various types of grading permit applications:

5.3.1.1 Transfer of Professional Responsibility

If the design professional (i.e. the professional responsible for project design) is changed:

- A. Prior to permit issuance: It shall be the duty of the permittee to notify the building official in writing of such change and to provide documentation that a replacement(s) has agreed to accept responsibility within the required area(s) of technical competence. The permit shall not be issued until such documentation is provided.
- B. After permit issuance: The work shall be stopped until the replacement has agreed in writing to accept responsibility within the area of technical competence for approval upon completion of the work. It shall be the duty of the permittee to notify the County's Director administering the work in writing of such change prior to the commencement or recommencement of such grading or associated work. (Adapted from Section 3317.8 of the 2001 California Building Code).

Type of Grading	Examples/ Clarification	Type of Project Association	Responsible Department
Agricultural Grading	Grading that involves the conversion of one acre or more of undisturbed vegetation to agricultural cropland. (Reference <i>General Plan Policy 7.1.2.7</i>)	Agricultural only; not done in conjunction with development of any structures	Agriculture Department
Residential Grading	Grading associated with the construction of single-family dwellings, accessory buildings, swimming pools, retaining walls, or residential driveways and multi-family site developments that are not associated with a division of land or off-site improvements	Single-Family building permits, Multi-Family building permits, and associated on-site structures	Development Services Department (DSD)
Non-Residential Development Grading (also known as "Commercial Grading")	Grading done on sites that are not residential and that are not associated with a division of land or off-site improvements	Non-Residential building permits such as commercial or industrial buildings	Development Services Department (DSD)
General Grading	Grading unrelated to the construction of single-family residences, accessory buildings, or residential driveways. Typical general grading would include ponds, pads for horse arenas, additional parking areas, and rural (non-County maintained) access roads.	General grading covers miscellaneous on-site grading not associated with structures.	Development Services Department (DSD)
Subdivision Grading	All subdivision grading (including parcel maps) irrespective of the type of land use (e.g., residential, commercial, etc.) includes mass pad grading across the property line of two or more, existing or proposed, contiguous lots or parcels.	Subdivision grading is associated with discretionary projects.	Department of Transportation (DOT)
Right of Way, Encroachments and Public Utility/Drainage Easements	Grading that takes place within the County's right-of-way.	Grading in the County's right-of-way is typically associated with discretionary projects or DOT's CIP projects	Department of Transportation (DOT)

*Source: Exhibit A of Resolution # 048-2007 adopted by the Board of Supervisors as Implementation of Chapter 15.14 of the County Code

5.3.2 Submittal Requirements

5.3.2.1 Grading plans

- A. Agricultural grading plans shall be prepared to the specifications of the County's Department of Agriculture. All other grading plans submitted to the County in support of a permit application shall be prepared by qualified individuals as discussed below and shall include the following:
1. **Certification:** The signature and professional stamp of the design professional except as provided in section 5.3.2.4 of this manual.
 2. **Plan Size:** Plans shall be submitted on sheets 24 inches by 36 inches unless an alternate paper size has been approved.
 3. **Number of Copies:** A minimum of three complete sets of grading plans shall be submitted.
 4. **Title Block;** Plans shall be entitled "Grading Plan" and state the purpose of the proposed grading. The name of the design professional responsible for plan preparation and the design professional in responsible charge shall be listed. The title block shall be located at the lower right corner or along the right edge of the plan sheet.
 5. **Topographic features:** Accurate contour lines drawn at intervals not greater than two feet of elevation, unless an alternate interval has been authorized by the Director of the Department issuing the permit, depicting topographic features and drainage patterns and the configuration of the ground before and after grading in the area proposed to be disturbed and immediately adjacent areas, relative to an established bench mark ~~established on site~~. Topographic maps shall be prepared by a design professional.
 6. **Limits of Grading:** The plans shall clearly delineate the boundaries between areas of cut, areas of fill placement, and areas that would remain at natural or pre-existing grade.
 7. **Property Boundaries:** Property lines and easements shall be clearly marked.
 8. **Construction Details:** Construction details for roads (including structural pavement sections), man-made watercourses, culverts, bridges and drainage devices, retaining walls, cribbing, dams, and other improvements existing or to be constructed, together with supporting calculations and maps as required.
 9. **Cross Sections:** Cross-sections, profiles, elevations, dimensions and construction details shall be provided based on accurate field data.
 10. **Erosion Control:** For projects greater than one acre in Disturbed Soil Area the following are required:
 - a. Waste Discharge Identification Number (WDID) Letter from the California State Water Resources Control Board, or Central Valley Regional Water Quality Control Board, and
 - b. Storm Water Pollution Prevention Plan (SWPPP).

~~For projects disturbing less than 1 acre, but more than 10,000 square feet, a Water Pollution Control Plan (WPCP) is required.~~

11. **Preliminary Landscape and Irrigation Plan:** A preliminary landscaping and irrigation plan to demonstrate consistency with “Title 17 Zoning Ordinance” and any discretionary approvals associated with the grading permit.
12. **Material Volume Estimate:** An estimate of the quantities of excavation and fill, adjusted for anticipated swell or shrinkage.
13. **Stockpiles and Borrow Sites:** The location of any on-site stockpile, borrow site, or location for storage of surplus material.
14. **Design Professional in Responsible Charge:** The name and contact information of the design professional in responsible charge shall be identified on the plans.
15. **Certificate Block:** A Certificate block (i.e. signature block for licensed professionals), shall be provided on the cover sheet of the project plans.
16. **Cost Estimate:** The applicant shall submit a detailed cost estimate covering the proposed work, except if the project is limited to grading associated with a single family dwelling on an individual lot.

5.3.2.2 Storm Water Management, Erosion and Sediment Control

A. Control of storm water, erosion, ~~and~~ sediment and other construction related pollutants is required for all grading projects.

1. **Storm Water Pollution Prevention Plan (SWPPP):** A Storm Water Pollution Prevention Plan and Waste Discharge Identification Number (WDID) are required for projects exceeding one acre in Disturbed Soil Area (DSA) by the conditions of the General Permit from the California State Water Resources Control Board (see prior section 5.2.2). Requirements for the SWPPP are found in the General Permit, and the County Storm Water Management Plan (SWMP). A copy of the SWPPP shall be kept on the project site at all times and made available to representatives of the County or State upon request.
- ~~2. **Water Pollution Control Plan (WPCP):** A Water Pollution Control Plan is required where any of the following conditions exist:
 - a. Non-agricultural projects where DSA exceeds 10,000 square feet;
 - b. There is a significant risk that more than 2,500 square feet will be unprotected or inadequately protected from erosion during any portion of the rainy season;
 - c. Grading will occur within 20 feet of any pre-existing watercourse;
 - d. Grading would occur within the 100-year event flood plain;
 - e. It is determined that the grading could potentially result in significant erosion or sediment discharge.~~

~~The Water Pollution Control Plans shall include design and implementation of Construction Site Best Management Practices (BMPs) to control storm water discharge, erosion and sediment from the project site in accordance with the provisions listed in section 5.2.2, paragraphs C through H of this Chapter.~~

~~Construction Site BMPs for Water Pollution Control Plans may be shown on a separate sheet, or shown on the grading sheets if all facilities and measures can be shown on the grading sheets without obscuring the clarity of either the grading plan or the Construction Site BMPs / WPCP.~~

~~3.2. **RCD Approval:** The applicant must submit grading plans (including SWPPP) to the Resource Conservation District (RCD) and obtain approval from the RCD for all erosion and sediment control practices prior to issuance of a grading permit by the County.~~

~~4.3. **Professional Recommendations:** SWPPPs and WPCPs shall comply with the recommendations of the design professional, as incorporated in the approved grading plans.~~

~~5.4. **Engineered Facilities:** The structural and hydraulic adequacy of all storm water containment or conveyance facilities shown on the plans shall be certified by the design professional through stamp and signature on the accepted plans. Sufficient calculations and supporting material to demonstrate such adequacy shall accompany the plans when submitted. Adequate provision shall be made for long-term maintenance of permanent erosion-control and sediment-control structures.~~

~~6.5. **Inspection, and Repair, and Maintenance:** WPCPs shall provide specific procedures for inspection, repair, and maintenance and repair of all erosion and sediment control facilities are required during the rainy season, and for sediment cleanout and vegetation maintenance. Inspection, maintenance and repair of construction site BMPs shall occur at least once per week, and prior to and immediately after storm events. During extended storm events, construction site BMPs shall be inspected at least once every 24 hours.~~

5.3.2.3 Technical reports

Certain technical reports may be required as part of a grading permit application. The types of reports, the qualifications of the report preparer and the circumstances under which a report is required are discussed below:

A. **Geotechnical Report:** A geotechnical report prepared under the direct supervision of, and sealed and signed by, a design professional shall be submitted at the time of application for all project types as required by the California Building Code. ~~except those associated with single family dwellings on an individual lot.~~

~~1. The geotechnical study report shall be based on observations and tests of the material exposed by exploratory borings or excavations~~

~~and inspections made at appropriate locations. Additional studies may be necessary to evaluate soil and rock strength, the effect of moisture variation on soil bearing capacity, compressibility, expansiveness, stability, and other factors. The report shall contain all of the following components that are applicable to the proposed work:~~

- ~~a. A plot plan showing the location of all exploratory borings and excavations;~~
 - ~~b. Descriptions and classifications of the materials encountered.~~
 - ~~c. Elevation of the water table, if encountered, and a description of other moisture conditions observed;~~
 - ~~d. Recommendations for foundation type and design that address bearing capacity, the potential for liquefaction, and the effects of expansive or weak soils;~~
 - ~~e. Recommendations for retaining wall type and design, including measures to address the effects of any adjacent loads;~~
 - ~~f. Expected total and differential settlement;~~
 - ~~g. A vicinity map showing the regional setting of the site;~~
 - ~~h. Laboratory test data pertinent to the evaluation of the nature, distribution and strength of existing soils;~~
 - ~~i. A general description of the geology of the site;~~
 - ~~j. A description of the geotechnical study techniques employed.~~
 - ~~k. A log for each exploratory boring and excavation showing the elevation at ground level, the depths from which samples were recovered and the depth of each soil or rock strata;~~
 - ~~l. An evaluation of the stability (including potential soil creep) of any proposed cut and fill slopes and proposed retaining walls;~~
 - ~~m. Recommendations for grading procedures and specifications, including excavation and fill placement;~~
 - ~~n. Recommendations regarding drainage and erosion control;~~
 - ~~o. Recommendations for pavement design;~~
 - ~~p. Recommendations for testing and inspection during construction;~~
 - ~~q. Recommended seismic design parameters;~~
 - ~~r. The signature and professional stamp of the design professional.~~
- ~~2. Geotechnical Design Criteria:~~
The report shall include all the following design criteria applicable to the site and work to be done:
- ~~a. Unit weight of the soil;~~
 - ~~b. Cohesion of the soil;~~
 - ~~c. Angle of internal friction of the soil (Φ);~~
 - ~~d. Equivalent fluid pressure;~~
 - ~~e. Allowable bearing pressure of the soil;~~
 - ~~f. Earth pressure from expansive or unstable soils;~~

- ~~g. Freeze/thaw depth;~~
- ~~h. Friction factor for resistance to lateral loads;~~
- ~~i. Passive pressure for resistance to lateral loads;~~
- ~~j. Drain rock/filter fabric requirements;~~
- ~~k. Moisture density curve with minimum in place density recommendations;~~
- ~~l. Erosion protection and maintenance requirements.~~

- B. Geologic Report:** A geologic report prepared under the direct supervision of and signed by a Certified Engineering Geologist or qualified Professional Geologist shall be submitted at the time of application if:
1. Such a report is required by the Director of the department issuing the permit;
 2. The project is located in an area of known geologic hazards such as unstable slopes, collapsible soils, severe erosion, rockfall or seismically-induced ground failure;
 3. The soil or geologic study report shall conform to the requirements of the California Building Code. ~~contain all of the following as they may be applicable to the subject site:~~
 - ~~a. A vicinity map showing the location of the site relative to known cultural features such as towns and roads;~~
 - ~~b. A topographic map of the site upon which the location of all borings, trenches and other exploratory excavations are marked;~~
 - ~~c. A description of the geology of the site and geology of the adjacent areas that may affect or be affected by the proposed development. This description shall include a discussion of the character of each rock unit exposed and the structural geology of the site;~~
 - ~~d. A geologic map of the site drawn on an accurate topographic base map that delineates the distribution of rock units and structural features (bedding, faults, landslide deposits, etc.);~~
 - ~~e. Geologic cross-sections that accurately depict the rock structure underlying the site;~~
 - ~~f. A description of any groundwater encountered in exploratory excavation or observed to discharge on the site;~~
 - ~~g. A description of the study techniques employed;~~
 - ~~h. A written description and a scaled graphic log of each boring, trench and exploratory excavation;~~
 - ~~i. An evaluation of the stability of natural slopes that could affect or be affected by the proposed development. The source of the material strength parameters used in the evaluation of slope stability shall be documented in the report. The scope of any required slope stability analysis shall be determined by the Director of the department issuing the permit;~~
 - ~~j. Recommendations regarding drainage and erosion control;~~

~~k. Recommendations for the mitigation or avoidance of identified geologic hazards. Pursuant to "Section 6835" of the "Geologists and Geophysicists Act", the report and all maps, plans, specifications, and other graphic materials shall be signed or stamped by the Professional Geologist or Certified Engineering Geologist responsible for the work.~~

C. **Drainage Report:** A drainage report prepared by a design professional in conformance with the design criteria provided in the County "Drainage Manual" is required with all grading permit applications. All drainage reports shall be prepared under the direct supervision of, and signed and stamped, by a design professional in conformance with the guidelines and design criteria provided in the County's "Drainage Manual". These reports shall contain, at a minimum, the following:

- ~~A.1.~~ A vicinity map showing the location of the site relative to known cultural features such as towns and roads;
- ~~B.2.~~ A topographic map of the site upon which the location of all watershed boundaries and watercourses are marked;
- ~~C.3.~~ Calculations that estimate the pre-project and post-project runoff;
- ~~D.4.~~ Recommendations for placement and design of any necessary drainage facilities.

Exceptions:

- ~~A.1.~~ The requirement is waived for minor projects where a study is not required by another regulatory agency;
- ~~B.2.~~ The project involves development of a single family dwelling. (A drainage study may be required due to special circumstances or the requirements of another regulatory agency.)

5.3.2.4 Waiver of the Requirement for Design Professional Prepared Plans

The requirement that grading plans (with the exception of agricultural grading plans) submitted for County review be prepared, signed and stamped by a design professional may be waived if all of the following conditions are met:

- A. The proposed grading would not endanger public health, safety or welfare;
- B. Cuts and fills do not exceed a combined total of 500 cubic yards;
- C. The grading does not involve an access road serving three or more existing or potential residences;
- D. A fill intended to support structures is not proposed;
- E. All proposed cuts or fills would be designed to avoid adverse affects on any adjacent structure or property;
- F. The construction of drainage or sediment-control structures, culverts or facilities would not be required;
- G. The alteration of an existing drainage course would not occur;
- H. An unstable slope condition would not be created;

- I. The grading would not affect the channelized flow of the 100-year storm event;
- J. The plan is prepared by the property owner of record for the subject parcel as allowed under ~~“Section 6744”~~ of the California “Business and Professions Code” (current section “Section 6744”);
- K. The submitted plans meet all other requirements of the County’s Design Manuals.

5.3.3 Grading Permit Processing Procedures

5.3.3.1 Review of Permit Applications

The design of proposed grading projects shall be reviewed for consistency with the *General Plan*, the County’s “Title 17 Zoning Ordinance”, the “California Building Code”, conditions of approval from discretionary actions by the County, the requirements of the “Grading Ordinance”, the “Drainage Manual”, this manual and other applicable regulations. Only grading projects found consistent with all applicable design standards, laws and regulations, and conditions of approval may be issued a grading permit.

5.3.3.2 County Review of Technical Reports

Any engineering, geotechnical or geologic study report shall be subject to the review and acceptance of the Director of the department issuing the permit. As part of the Director’s review of the submitted report, supplemental reports and data may be required prior to report acceptance. Reports may be found inadequate for County use based on inaccurate description of the conditions on the project site, failure to address the technical issues identified by the County, failure to meet established standards of professional practice, the lack of clear professional recommendations, or the lack of an original signature and stamp affixed by the design professional responsible for the work. Recommendations included in reports shall be incorporated in the final plans and specifications.

5.3.3.3 Compliance With CEQA

The California Environmental Quality Act (CEQA) may require the preparation of environmental documents concerning a proposed grading project. In such event, the County may function as the lead agency or a responsible agency. The applicant will be advised as to any additional information required with the permit application. The applicant shall be required to pay all costs associated with the preparation and processing of an environmental document. The department issuing the permit shall decide whether to prepare the document itself or retain a consultant(s) to prepare the document.

5.3.3.4 Standard Conditions Of Approval

- A. **Consistency with County Design Standards:** The proposed grading shall conform to the design standards established in the County’s Design Manuals, including this manual.

- B. Follow-up to a Discretionary Approval:** Where a proposed grading project would implement a discretionary permit approval (i.e., Special Use Permit, subdivision of land, etc), no grading permit shall be issued prior to approval of the discretionary use by the applicable planning authority.
- C. Compliance with Terms of Approval:** The permit shall be limited to work shown on the grading plans. In issuing a permit, the Director of the department issuing the permit may impose any condition of approval deemed necessary to protect the health, safety and welfare of the public, to prevent the creation of a hazard to public or private property, and to assure proper completion of the grading, including but not limited to:
1. Mitigation of adverse environmental impacts disclosed in any environmental document;
 2. Reconfiguration of any existing graded surface to comply with the standards of this Manual;
 3. Installation of fencing or other protective devices to avoid work site hazards or environmental damage;
 4. Requirements for dust, erosion, sediment and noise control, hours of operation and season of work, weather conditions, sequence of work, access roads and haul routes;
 5. Requirements for safeguarding watercourses from deposition of sediment or debris in quantities exceeding natural levels;
 6. Requirements for safeguarding areas reserved for on-site sewage disposal;
 7. Demonstration by the applicant, through adequate engineering or geologic analysis and report, that the site of the proposed grading activities is not subject to unstable slopes, substantial settlement, erosion, flooding or seismic hazards or that such hazards are adequately mitigated by the design recommendations included in the submitted report(s);
 8. Demonstration by the applicant of compliance with State or Federal regulations. A Grading Permit issued by a department of the County of El Dorado shall not relieve the permittee of responsibility for securing other permits or approvals as required by other County agencies or agencies of the State or Federal government.
- a.D. Changed Conditions:** Where conditions encountered in the grading operation deviate from that anticipated in the geotechnical and geologic study reports, or where such conditions warrant changes to the recommendations contained in the original studies, revised reports may be required.
- b.E. Safety:** Excavations shall not endanger life or property. Access to any temporary or permanent excavation that constitutes a potential safety hazard shall be restricted by fencing or other barrier as long as such hazard exists. Excavation safety measures shall conform to any applicable CAL-OSHA standards.
- c.F. Setbacks:** Grading and other development shall be set back from property boundaries, established easements, creeks or other water bodies, steep

natural slopes and other resources as required by the *General Plan*, the County's "Title 17 Zoning Ordinance", the conditions of approval of any applicable subdivision map or discretionary permit, the "California Building Code" and this manual. Setback distances may be increased based on a recommendation included in an acceptable geotechnical or geologic report. Any request for a reduced setback would require similar documentation and would be reviewed for consistency with the *General Plan*, "Title 17 Zoning Ordinance" and other applicable regulations.

d.G. Protection of Levees: No person shall excavate or remove any material from, or otherwise alter, any levee required for river, creek, bay, or local drainage control, without prior approval of the local governmental agency responsible for the maintenance of the levee.

e.H. Obstruction of Storm Waters: Grading activities that obstruct, divert, impede or interfere with the natural flow of storm waters within man-made channels or natural watercourses are prohibited unless it is demonstrated that all of the following are true:

1. The proposed activities will not cause flooding or exacerbate an existing flooding condition as documented in a County-accepted drainage report conforming to the requirements set forth in the "Drainage Manual".
2. The proposed activities would not result in severe or ongoing erosion.
3. The applicant is in compliance with applicable sections of the "State of California Water Code", "State of California Fish and Game Code", "The National Clean Water Act", the County's SWMP, and other applicable local, State, and Federal laws.

5.3.3.5 Tahoe Basin Special Conditions of Approval

1.A. General: All grading projects shall conform to the rules and regulations of the Tahoe Regional Planning Agency (TRPA). See Chapter 7 for TRPA contact information.

2.B. Grading season: Grading shall be prohibited during the period from October 15th through May 1st unless otherwise provided by this Manual. The County requires complete winterization of any project by October 15th pursuant to "Section 64.2" of the TRPA "Code of Ordinances".

3.C. Other agencies: All grading work shall conform to any restriction required by other Federal, State, or local agencies.

4.D. Applicability: Except for section "15.14.140 (Exemptions)", the provisions of the County's "Grading, Erosion and Sediment Control Ordinance, Chapter 15.14" of the "County Ordinance Code", shall apply to grading activities in the Tahoe Basin.

5.E. Permit waivers: The requirement for a grading permit may be waived if the work complies with all the following conditions:

- a.1.** The excavation does not exceed five feet in vertical depth at its deepest point measured from the existing ground surface, there is

not a reasonable possibility of interception of a water table, and the volume of earth moved does not exceed three cubic yards;

b.2. The fill does not exceed three feet in vertical depth at its deepest point measured from the original ground surface and the fill material does not exceed three cubic yards per site;

e.3. Disturbance, injury, or removal of vegetation has been authorized by a TRPA project approval in accordance with “Section 65.2” of the TRPA “Code of Ordinances”.

5.3.3.6 Grading Plans For Stockpiles

Plans submitted for a stockpile permit application must comply with the application requirements listed in this manual. The plan must also contain all of the following:

1.A. The estimated date the stockpile will be removed from the site. This date shall not exceed one year from the date of initial placement. An extension of time may be granted for good cause shown;

2.B. A prominent note stating that the final inspection shall not be complete until all of the stockpiled material has been removed from the site, or utilized as part of a permitted development project, and that all required permanent erosion control devices and materials are in place;

3.C. A written statement signed by the landowner that acknowledges and accepts the following:

D.1. The landowner authorizes the placement, temporary storage and removal of earth materials on the subject property as specified in the approved grading plans;

E.2. The landowner is solely responsible for the stockpile and for compliance with the terms and conditions of approval included in any relevant permit;

F.3. The person (named) submitting the permit application is acting as an agent of the landowner.

5.3.3.7 Modification of Approved Plans:

- A. Requests for modifications of an approved final plan shall be submitted to the County for review.
- B. All necessary geotechnical and geological information, and all design details shall accompany any proposed modification.
- C. The proposed modification shall be consistent with any applicable subdivision map or use permit conditions of approval.

~~5.3.3.8 Transfer Of Professional Responsibility Prior To Permit Issuance~~

~~If the design professional of record (i.e. the professional responsible for project design) is changed prior to permit issuance, it shall be the duty of the permittee to notify the building official in writing of such change and to provide documentation that a replacement(s) has agreed to accept responsibility within the required area(s) of technical competence. The permit shall not be issued until such documentation is provided.~~

5.3.3.9 Water Impoundments

A. DSOD-Regulated: Water impoundments involving a dam greater than twenty-five feet in height or storage of more than fifty acre-feet of water (or other design thresholds currently adopted by the State) are under the jurisdiction of the State of California Department of Water Resources, Division of Safety of Dams (DSOD). The height of a dam shall be measured from the lowest elevation of the outside limit of the dam to the maximum possible water storage elevation (i.e. the spillway elevation). Such reservoirs require a grading permit issued by the County with engineering review and approval by DSOD. The grading permit can only be issued if the project is found in conformance with County regulations, including the *General Plan*.

B. Non-DSOD Regulated: Construction of any dam or obstruction to water flow shall require a grading permit pursuant to “Section 15.14.130” of the “County Ordinance Code” and this manual. Design and construction standards for non-jurisdictional dams are established in the “Drainage Manual”. The construction of dams shall follow the current practices of the California Department of Water Resources, Division of Safety of Dams as set forth in the “Guidelines for the Design and Construction of Small Embankment Dams.”

5.3.4 Inspections and Construction Requirements

5.3.4.1 Inspections

A. Construction Schedule: When required, a project schedule shall be provided that includes, as a minimum, the dates of:

1. Commencement of work;
2. Start and finish of rough grading;
3. Completion of drainage facilities;
4. Completion of work in any watercourse;
5. Completion of erosion and sediment control facilities;

56. Completion of hydro mulching and other drought-resistant landscaping. If rough grading is proposed between October 15th and May 1st, a more detailed schedule of grading activities and use of erosion and sediment control facilities may be required (final schedule to be provided after the grading permit is issued prior to the beginning of construction).

B Regular Inspections: The County may inspect any work done under the authority of a permit granted pursuant to the “Grading, Erosion, and Sediment Control Ordinance”. No permittee shall be deemed to have complied with this Ordinance until a final inspection of the work has been completed by the County and it has been determined in writing that the work has been completed in accordance with all requirements and conditions of the permit. The permittee shall provide adequate access to the site for

inspection during the performance of all grading work and for a minimum period of one year after the final inspection of all improvements.

C. **Violation and abatement inspections:** Pursuant to section D.1. below, the Director of the department issuing the permit may require site inspections to investigate an alleged violation of the “Grading, Erosion, and Sediment Control Ordinance”, or inspections necessary to document the abatement of a verified violation of this Ordinance.

D. **Special Inspections:**

1. Criteria for special inspections: As a condition of any permit, or as part of the investigation or abatement of a violation of the “Grading Ordinance”, the Director of the department issuing the permit, may require the permittee to provide periodic or continuous monitoring of the construction activities under the direction and responsibility of the design professional within their area of expertise and licensure. The permittee shall contract for such services and be responsible for the payment of all costs. Continuous or periodic observation and reporting by the design professional shall include, but not be limited to, the following situations:

- a. During the preparation of a site or the placement of fills which exceed three feet in depth on slopes which exceed 10 percent;
- b. Fill placement for vehicular ways shall be continuously inspected when fills exceed 10 feet in height;
- c. During the preparation of a site for the placement of any fill and during the placement of such fill which is intended to support any building or structure;
- d. During the installation of subsurface drainage facilities;
- e. Construction of retaining wall; see section 5.2.6 of this manual.

The use of a licensed professional for inspections or observations shall not preclude additional inspections by representatives of the County.

2. Special Inspection reports: Reports filed by the design professional regarding a special inspection shall state in writing a professional opinion, based on personal knowledge, that adequate inspection has been performed and the work accomplished during the period covered by the report has been completed in substantial accordance with the approved plans and specifications.

E. **Progress Reports:** When required, periodic progress reports shall be provided under the direction of the design professional in responsible charge that address the following:

1. Laboratory test results;
2. Slope stability;
3. Placement of materials;
4. Retaining wall installation;
5. Installation of drainage facilities;
6. Installation of utilities;
7. Compliance with special permit or plan requirements;

8. Other technical issues.
- F. **Storm Water Inspections:** Inspection and monitoring of construction BMPs is required to reduce or eliminate erosion and sediment or other pollutant discharge to storm drains and waterways, under the General Permit issued by the State Water Resources Control Board (see sections 5.2.2 and 5.3.2 above). Attention is directed to that document.
- G. **Final Technical Reports:** Upon completion of grading work, a final report(s) may be required that addresses geotechnical, geologic, drainage or engineering issues and includes, but is not limited to the following:
- A.1. A complete record of all field and laboratory tests including location and elevation of all field tests;
 - B.2. A professional opinion regarding slope stability, soil bearing capacity, and any other pertinent information;
 - C.3. Recommendations regarding foundation and roadway design, including soil bearing potential, and building restrictions or setbacks from the top or toe of slopes.
 - D.4. A declaration of professional opinion by the design professional, in the format required by the County, as to whether the work was done in substantial accordance with the recommendations contained in the accepted soil or geologic reports and in conformance with the approved plans and specifications, including but not limited to, line, grade and drainage design.
- H. **As-built plans:** When required, the permittee shall submit an "as-built" grading plan following completion of grading operations in an acceptable format.

5.3.4.2 Construction Site Requirements

- A. **Protection of Existing Utilities:** The permittee shall take all reasonable measures to prevent or avoid damage to existing public utilities or services. The permittee shall be responsible for the cost of repair of any damage to facilities resulting from the grading activities performed under the authority of the permit.
- B. **Protection of Adjacent Property:** The owner of record of the property upon which the grading permit is issued is responsible for any physical damage to adjacent property resulting from the grading activities. All persons shall take all reasonable measures to prevent or avoid damage to any adjoining public street, sidewalk, alley or other public or private property.
- C. **Advance Notice:** The permittee shall construction-stake the site and notify the County at least 48 hours prior to the start of work.
- D. **Grading Limits:** Limits of grading shall be clearly defined and marked in the field to prevent damage by construction equipment. Wetlands and oak trees shall be protected from construction activity as described in Chapter 2 of this manual.

- E. **Minimization of Exposed Area:** During the rainy season, the smallest practical area of erodible land shall be exposed at any one time during grading operations and the time of exposure shall be minimized.
- F. **Storm Water, Erosion and Sediment Control:** The permittee shall fully comply with the requirements of the County Storm Water Management Plan (SWMP), Clean Water Act, the California State Water Quality Control Board (SWRCB) Rules and Regulations, ~~the requirements of the Construction Activities Storm Water General Permit Order No. 99-08-DWQ (General Permit)~~ and other applicable orders and permits issued from time to time by the SWRCB. The permittee is shall take responsible for the following during construction operations:

~~all reasonable measures to prevent or avoid:~~

~~9.1. Implementation and maintenance of storm water and non-storm water BMP's to reduce or eliminate discharge of sediment or other pollutants to sediment from the site, in quantities exceeding State Water Resources Control Board standards, to any watercourse, drainage system, or adjacent property;~~

~~10.2. Damage to watercourses and adjacent properties in the form of erosion, flooding, or deposition which may result from the permitted grading;~~

~~11.3. Sediment deposition onto public or private vehicle ways.~~

Construction site BMP's shall be inspected by the permittee weekly during the rainy season, and in advance of forecasted storm events. Following any storm event, BMP's shall be inspected for effectiveness and replaced and/or supplemented as necessary.

Attention is directed to Sections 5.2.2 and 5.3.2 of this Manual.

- G. **Approved Plans:** One set of approved plans and permit shall be retained on the site and made available for use by the County inspector at all times during the work.

~~5.3.4.3 Transfer of Professional Responsibility After Permit Issuance~~

~~If the design professional (i.e. the professional responsible for project design) is changed, the work shall be stopped until the replacement has agreed in writing to accept responsibility within the area of technical competence for approval upon completion of the work. It shall be the duty of the permittee to notify the County's Building Official in writing of such change prior to the commencement or recommencement of such grading or associated work. (Adapted from Section 3317.8 of the 2001 California Building Code)~~